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Use Of Crop Combination Technique For Quantitative Evaluation Of Landuse In Parner Tahsil, Ahmednagar District In 2022-23

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Abstract:

This study investigates the patterns of crop combinations in the Parner Tahsil of Ahmednagar District, Maharashtra, utilizing Weaver's Crop Combination Method to assess agricultural diversification and development. The research highlights how crop cultivation adapts to varying physio-socio-economic conditions and the impact of agricultural innovations. Data from the Ahmednagar District Gazetteer, socio-economic abstracts, and census handbooks for the years 2022-2023 reveal a variety of crop combinations, including four, six, seven, eight, and ten-crop mixes. By converting crop areas into percentages, the study analyzes spatial variations in crop distribution and ranks, offering insights into the current state of agriculture. The findings show diverse crop combinations and their geographical distribution, indicating varying levels of agricultural growth and diversification across the tahsil. This research provides valuable insights for agricultural planning and policy-making aimed at optimizing land use and enhancing crop production.

Keywords: Crop Combination, Weaver's Method, Land Use Pattern, Spatial Distribution

Introduction:

After the land use pattern has been examined, the growth patterns of various crops and how they adapt to the physio-socio-economic conditions in the district have been brought to light. Crop development and cultivation are closely linked to both decision-making processes and the acceptance of agricultural innovations, including the use of chemical pesticides and fertilizers, high-yielding variety utilization, and improved, more efficient equipment. The hectare under each crop offers a genuine representation of agricultural land usage and relative strength in the analysis of the region's crop ranking. The ranks of the crops and their combination produce spatial variation in the distribution patterns. The current state of agriculture is shown in this regard by research on crop combination and diversification.

Objectives:

To use Weaver's approach to identify the patterns of crop combination in the Parner Tahsil and plot such patterns in areas of crop combination.

Data Source:

The Ahmednagar District Gazetteer, Ahmednagar District Socio-Economic Abstract, and Ahmednagar District Census Handbook served as the study's data sources. Data were gathered from the Tahsil head office for a variety of crops in both kharif and rabbi crops for the years 2022–2023. A multitude of spot inquiries are supplemented with it. To rank crops and ascertain their relative potency, crop areas have been converted to percentages (to net planted area).

Study Area:

The Parner Tahsil is situated in the Ahmednagar District in western Maharashtra, between latitudes 19°00'18" North and longitude 74°26'34" East. By road, Pune is about 80 kilometers from Ahmednagar (40 km) and Ahmednagar (70 km). In Parner Tahsil, pomegranate and onion farms are very common. The tahsil has grown in popularity as a tourist attraction due to its stunning surroundings and pleasant, calm, and mild climate. Parner is unique due to its mythological, historical, social, and cultural significance. The hamlet is thriving on all fronts: industrial, political, social, and cultural. Parner Tahsil is the birthplace of numerous well-known people, such as Anna Hazare, Maharshi Parashar, and Semapati Bapat.

Methodology

Weaver's Crop Combination Method

In 1954, Weaver became the first agricultural geographer to use statistical methods to illustrate crop combinations in the Middle West. (USA). In an attempt to delineate the limits of the agricultural regions of the Middle West in the United States, Weaver based his study on acreage figures. Weaver determined the proportion of total harvested cropland that each crop occupied in each of the counties that comprised his study area, up to one percent of the total cultivated land. Except for a few counties (like Minnesota and Houston), where the crop combination was easily ascertained, the majority of counties showed a disorganized and perplexing picture of the percentage of land that was

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planted for different crops. Thus, "a rigorous approach that would give an objective constant and exactly repeatable procedure that would yield comparable findings for different years and locations" was needed. In his work, Weaver evaluated the variance between a theoretical norm for all possible combinations in the component areal units and the real percentage of crops (occupying one percent of the cultivated area). The following method was used to apply the theoretical curve for the standard measurement:

Monoculture = 100 % of the total harvested crop land in one crop.

Two crop combination = 50 % in each of two crops.

Three crop combination = 33.3 % in each of three crops

Four crop combination = 25 % in each of four crops

Five crop combination = 20 % in each of five crops

Ten crop combination = 10 % in each of ten crops

For the determination of the minimum deviation, the standard deviation method was used:

$$SD = \sigma\Sigma\ d2/n$$

Where, d= the discrepancy between the proper percentage on the theoretical curve and the actual crop percentages in a specific county (areal unit) and

n= the number of crops in a given combination.

Square roots were not removed since, as Weaver noted, it was important to consider relative value rather than absolute value, hence the following formula was used:

$$d = \Sigma\ d2/n$$

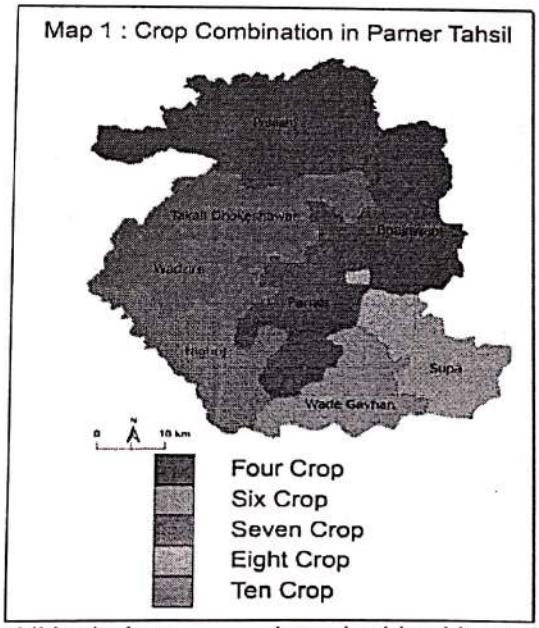
The percentage share of crops in the cropped area in the year (2022-23) was as follows: Jawar 21.05 percent, Onion 16.84 percent, Pulses 15.90 percent, and Bajara 14.58 percent. This example is from the Takali Dhokeshwar circle.

Table 1: Crop Combination in Parner Tahsil (2022-23)

Combination Type	Crops in Combination	No. of Circles	Area in Hectares	% of Total Area
Four Crop	B/J/O/P	3	0	38.08
Six Crop	J/B/P/O/W/FC	1	19216	11.81
Seven Crop	J/B/O/P/OC/V/W/FC/M	2	41351	25.41
Eight Crop	J/P/O/B/FC/W/M/OC	1	19838	12.19
Ten Crop	O/B/P/FC/V/W/M/J/OS/OC	1	20353	12.51
Total		**08**	**100758**	**100.00**

(Source: By the Researcher)

J = Jawar B = Bajra W = Wheat
V = Vegetable Os= Oil-seeds P = Pulses
FC= Fodder Crops O = Onion M = Maize
OC= Other Crops



The five-crop combination exhibits the least variation of the actual percentages from the theoretical curve. The identity and quantity of crops in the fundamental combination for the circle were determined by this result to be J/B/P/O/OC (Jawar, Bajra, Pulses, Onion, Other Crops, etc.).

Crop Combination: Application and Results

Regarding Parner Tahsil in 2022–2023, there were four, six, seven, eight, and 10 crop

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combinations. (Map 1). The circles and areas under each crop combination are shown in table no. 1 and map no. 1.

1: Four Crop Combination

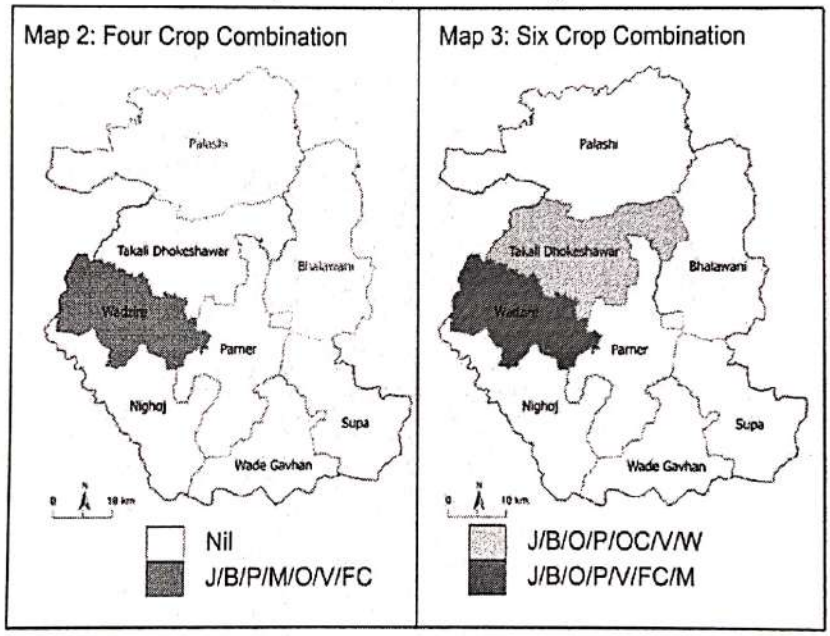
Four crop combinations show a growth in the number of crops with a comparative degree of crop combination diversity in 2022–2023. This mix of four crops bajara, onion, pulses, and jawar entered in turn. Over the tahsil, the area with the four crop combinations was widely dispersed (Map 2, Table 2).

Map 2 shows that the four crop combinations occupied 61964 hectares (38.08 percent of the total area) in the tahsil. In addition, it was evident that the tahsil contained three circles representing four crop permutations. A mixture of Bajra, Onion, Pulses, and Jawar covered 24615 hectares (or 39.72% of the total area) in Palshi. Table 4 and Map 2 show that the combination of pulses, Jawar, Bajra, and Onion occupied 19699 hectares (or 31.79% of the entire area) in Bhalwani and 17650 hectares (28.59% of the total area) in Parner. A large area of the tahsil was attributed to this combination.

Table 2: Four Crop Combinations (2022-23)

Sr. No.	Crops in Order	No. of Circles	Area in Hectares	% of Total Area
1	B/O/P/J	1	24615	39.72
2	P/J/B/O	1	19699	31.79
3	J/P/B/O	1	17650	28.49
	Total	**3**	**61964**	**100.00**

(Source: By the Researcher)



2: Six Crop Combinations

In 1990–91, there was not a single circle under any of the six crop combinations (Map 3). Six crop combinations showed increases in the number of crops with comparatively higher levels of agricultural diversity in 2022–2023. This combination of crops has six entries: Jawar, Bajra, Pulses, Onion, Wheat, and Fodder Crops. The eastern portion of the circle contained the region with the six crop combinations

Table 3: Six Crop Combinations (2022-23)

Sr. No.	Crops in Order	No. of Circles	Area in Hectares	% of Total Area
1	J/B/P/O/W/FC	1	19216	100
	Total		**19216**	**100**

(Source: By the Researcher)

Map 3 showed that the six-crop combination area encompassed 19216 hectares (13.25 percent of the total area) in the eastern portion of the circle. Additionally, it was evident that one circle, the Supa circle, contained six crop combinations: Jawar, Bajra, Pulses, Onion, Wheat, and Fodder crops. These combinations spanned 19216 hectares, or 100% of the total area (Map 3, Table 3).

3: Seven Crop Combinations

Seven crop combinations show a rise in the number of crops with a comparative degree of crop

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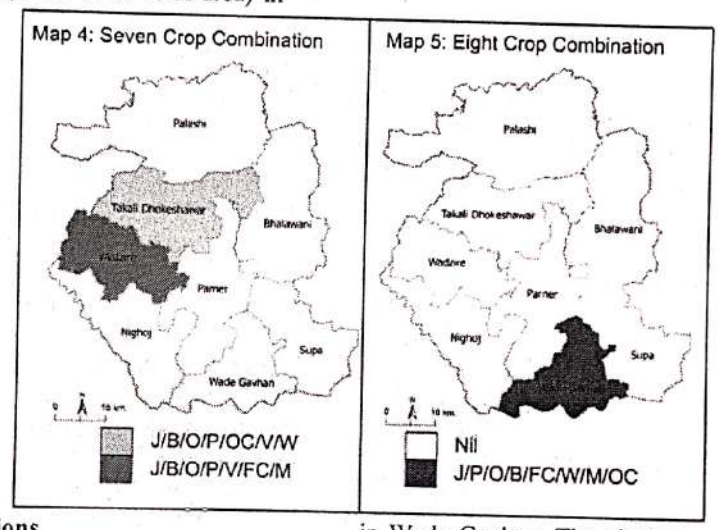
combination diversity in 2022-2023. Ten crops total -Jawar, Bajra, Onion, Pulses, Other Crops, Vegetables, Wheat, Fodder Crops, and Mize were entered in this combination.

Table 4: Seven Crop Combinations (2022-23)

Sr. No.	Crops in Order	No. of Circles	Area in Hectares	% of Total Area
1	J/B/O/P/OC/V/W	1	23225	56.17
2	J/B/O/P/V/FC/M	1	18126	43.83
	Total	**2**	**41351**	**100**

(Source: By the Researcher)

The seven crop combinations were dispersed throughout the entire tahsil. Map 4 shows that 41351 hectares, or 28.50% of the total area, were covered by the seven crop combinations. Additionally, it was evident that the tahsil had two circles with seven crop combinations in each. Wadzire has a combination of Jawar, Bajra, Onion, Pulses, Fodder Crops, Vegetables, and Mize covering 18126 hectares (43.83 % of total area) in the tahsil, while Takali Dhokeshwar has a combination of Jawar, Bajra, Onion, Pulses, Other Crops, Vegetables, and Wheat covering 23225 hectares (56.17 % to total area) (Table 4 & Map 4). The circles are situated in Tahsil's western region. The irrigation facilities are very poorly developed in these circles so more crop combination was recorded.



4: Eight Crop Combinations

Eight crops, including wheat, maize, beans, onions, bajra, fodder crops, and jawar, joined together in a single circle to form the eighth crop combination in 2022-2023. According to Map 5, the tahsil's eight-crop combination region was situated in Wade Gavhan. The eight crop combinations are shown in Table 5 along with their areas, circles, and orders within the tahsil. Table 5 and Map 5 show that the Wade Gavhan circle's eight crop combinations spanned 19838 hectares or 13.67% of the total area.

Table 5: Eight Crop Combinations (2022-23)

Sr. No.	Crops in Order	No. of Circles	Area in Hectares	% of Total Area
1	J/P/O/B/FC/W/M/OC	1	19838	100
	Total	**1**	**19838**	**100**

(Source: By the Researcher)

5: Ten Crop Combinations

Ten crop combinations from 2022-2023 showed increases in the number of crops with comparatively higher levels of agricultural diversity. Ten crops total -onion, bajra, pulses, vegetables, fodder crops, wheat, meze, jawar, oilseeds, and other crops were included in this combination. The southwest portion of the tahsil was placed to the ten crop combinations.

Table 6: Ten Crop Combinations (2022-23)

Sr. No.	Crops in Order	No. of Circles	Area in Hectares	% of Total Area
1	O/B/P/FC/V/W/M/J/OS/OC	1	20353	100
	Total		**20353**	**100**

(Source: By the Researcher)

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The ten crop combinations were found to be in the southwestern portion of the tahsil, specifically in the Nighoj circle. These combinations covered 20353 hectares, or 14.03 percent of the total area, and included onions, bajra, pulses, vegetables, wheat, meze, jawar, oilseeds, and other crops (Map 6, Table 6).



Remarks:

Thus, it can be said that the crop combination approach based on primary data, which indicates the levels of agricultural growth for each circle, has shown to be a useful method of circle classification.

1. Throughout the research periods, some of the circles classified as having a low level of growth have stayed at that level. Palshi and Bhalavani are their names. This indicates that to achieve development that has been halted, such circles need to use additional planning tools.
2. The development of Wade Gavhan and Takali Dhokeshwar circles has been raised from low to medium. These modifications are the result of agricultural development and micro-irrigation.
3. It's noteworthy to note that, based on the composite score values, the circles representing Nighoj have developed to a higher degree. This could be as a result of the larger-than-average quantity of agricultural development indicators.

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To Study Agricultural Development Use of Crop Diversification Technique for Quantitative Evaluation of Landuse in Parner Tahsil, Ahmednagar District in 1990-91 to 2022-23

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TO STUDY AGRICULTURAL DEVELOPMENT USE OF CROP DIVERSIFICATION TECHNIQUE FOR QUANTITATIVE EVALUATION OF LANDUSE IN PARNER TAHSIL, AHMEDNAGAR DISTRICT IN 1990-91 TO 2022-23

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ABSTRACT

Using Bhatia's agricultural diversification methodology to assess spatial variations, this study looks at how crop diversification has changed in Parner Tahsil between 1990–1991 and 2022–2023. The findings show a noteworthy transition in crop diversification from moderate to high, suggesting that agricultural practices are dynamically adapting to environmental and socioeconomic shifts. In comparison, the expansion of locations with high diversification—such as Palshi, Takali Dhokeshwar, and Bhalavani—contradicts the shrinkage of areas with moderate and low diversification. This pattern corresponds with the growing use of a variety of crops, including as onions, pulses, jawar, and bajra, and it is in line with developments in agricultural infrastructure and technology. The results highlight a more significant shift in Parner Tahsil's agricultural land use and practices, highlighting the necessity of continued study and changes to legislation to promote sustainable agricultural growth.

KEYWORDS: *Crop Diversification, Bhatia's Methodology, Spatial Variation, Land Use Patterns, Temporal Variation*

INTRODUCTION

The growth patterns of different crops and how they adjust to the physio-socio-economic conditions in the district have been revealed after the land use pattern has been studied. The acceptance of agricultural advancements, such as the use of chemical pesticides and fertilizers, the use of high-yielding varieties, and the use of better, more efficient equipment, is strongly tied to the production and cultivation of crops. When analyzing the crop ranking of the region, the hectare under each crop provides an accurate depiction of agricultural land usage and relative strength. The

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distribution patterns exhibit spatial variance due to the ranks of the crops and their combination. Research on crop diversification and combination demonstrates the current status of agriculture in this regard.

OBJECTIVES

To use Bhatia's approach of agricultural diversification to discover the patterns of crop diversification in the Parner Tahsil.

DATA SOURCE

The study's data sources were the Ahmednagar District Gazetteer, Ahmednagar District Socio-Economic Abstract, and Ahmednagar District Census Handbook. For the years 2022–2023, information on a range of crops in both kharif and rabi crops was obtained from the Tahsil head office. It is added to a plethora of spot questions. Crop areas have been converted to percentages (to net planted area) in order to rank crops and determine their relative potency.

STUDY AREA

Located in western Maharashtra's Ahmednagar District, the Parner Tahsil is situated between latitudes 19°00'18" North and longitude 74°26'34" East. Pune is roughly 80 kilometers (40 km) and 70 km) from Ahmednagar by road. Pomegranate and onion farms are prevalent in Parner Tahsil. The breathtaking surroundings and pleasant, tranquil, and moderate atmosphere of the tahsil have contributed to its growing popularity as a tourist destination. The mythological, historical, social, and cultural significance of Parner makes it special. The hamlet is prospering politically, socially, culturally, and industrially. Many famous persons, including Anna Hazare, Maharshi Parashar, and Semapati Bapat, were born in Parner Tahsil.

METHODOLOGY

Bhatia's Crop Diversification Method

The agricultural diversification pattern in the area is ascertained using the crop-combination method. Its meaning is to develop a variety of crops on fertile soils. It illustrates how physio-social-economic aspects have an effect. It also illustrates the competition that crops currently face in a particular location, the possibility of rotation, and the effects of double cropping (Husain, 1979).

As the number of crops rises and competition intensifies, so does the degree of diversification. Numerous geographers and economists have applied the concept of diversity in a variety of settings. Cleann (1930) was the first to apply this concept in the manufacturing sector. Tree (1938), Florence (1942), and Rainwald (1949)

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followed suit in determining the extent of concentrations and diversifications. Gibb Martin (1974) used the concept of diversification to calculate the measurement of job diversity in industry. Bhatia's crop diversification technique was refined by Ayyar (1969) by taking into consideration crops that make up at least 1% of the gross cropped area. In order to better understand agricultural competitiveness in the area, geographers Bhatia (1965) and Jasbir Singh (1976) adapted and applied crop diversification strategies.

1: Crop Diversification Technique

Bhatia's method has been updated to discover the regional pattern of crop diversification in the current study. Crops with less than five percentage points have been taken out of the calculation. The updated expression of this formula is:

$$\textbf{Index of Crop Diversification} = \frac{\text{Percentage of Net Sown Area}}{\text{Number of 'n' Crops}}$$

where 'n' Crops are defined as those that collectively occupy five or more percent of the net sown area in a tahsil.

2: Crop Diversifications: Application and Results

The obtained results are displayed in Map 1, Tables 1, 2, and 3, which display the total number of crops, the number of crops in competition with one another, and the circles and regions in the Parner Tahsil that are involved in crop diversification.

Table 1: Patterns of Crop Diversification (1990-91 and 2022-23)

Diversification		No of Circles		% of Total Circles		Area (Hectares)		% of Area	
Class	**Magnitude**	**1990**	**2022**	**1990**	**2022**	**1990**	**2022**	**1990**	**2022**
0-20	High	02	04	25.00	50.00	21200	82052	18.27	59.87
20-30	Moderate	04	03	50.00	37.50	68300	44321	58.87	32.34
>30	Low	02	01	25.00	12.50	26523	10688	22.86	07.80
Total		**08**	**08**	**100**	**100**	**116023**	**137061**	**100**	**100**

(Source: By the Researcher)

Maps 1 A & B depict the crop diversification's spatial distributional trend within the tahsil. Crop diversification is highest in the Nighoj (15.50) circle and lowest in the Parner (41.18) circle in 1990–91, whereas it is highest in the Palshi

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(13.38) circle and lowest in the Nighoj (38.99) circle in 2022–2023. Maps 1A and B show that the following three crop-diversification regions have been identified:

1) Area of high crop diversification
2) Area of moderate crop diversification
3) Area of low crop diversification

The three different crop diversification kinds are shown in Table 1 along with their class, magnitude, circles, and area. In the Parner tahsil, the class with the highest crop diversification in 1990–1991 covered 25.00 percent of the circle; the class with moderate crop diversification covered 50.00 percent of the circle; and the class with lowest crop diversification covered 25.00 percent of the area. This table illustrates these relationships. In the Parner and Wade Gavhan circles, where crop diversity was minimal, the three crops—Jawar, Bajara, and Pulses—were vying for agricultural diversification. The two crops, Bajra and Jawar, were vying for diversification in Parner Circle. Jawar and Pulses competed for diversification in the Wade Gavhan circle in Parner Tahsil (Table 2).

Table 2: Pattern of Crop Diversification (1990-91)

Name of the Tahsil	Index of Crop Diversification	Crops in Competition for Diversification	Area in Hectares	% Area
Palshi	22.01	J+B+P	22600	19.48
Takali Dhokeshwar	24.46	J+B+P	13700	11.81
Wadzire	19.58	J+B+P+M	10500	9.05
Nighoj	15.50	B+W+P+O+OC	10700	9.22
Parner	41.18	J+B	13500	11.64
Supa	25.08	J+B+P	15000	12.93
Bhalawani	26.19	J+B+P	17000	14.65
Wade Gavhan	37.79	J+P	13023	11.22

(Source: By the Researcher)

Note:

J = Jawar B = Bajra W = Wheat

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V = Vegetable Os= Oil-seeds P = Pulses
FC= Fodder Crops O = Onion M = Maize
OC= Other Crops

The three crops—Jawar, Bajara, and Pulses—were in competition for diversification in the Palshi, Takali Dhokeshwar, Supa, and Bhalavani circles in Parner tahsil, and they followed the mild crop diversification observed in those circles. The crops Jawar, Bajara, Pulses, Mize, Wheat, Onion, and Other Crops were competing for diversification in Wadzire and Nighoj circles in Parner tahsil, and these are the circles with the highest agricultural diversification observed (Table 2).

In 2022-23 it noticed greatest area appears in the high crop diversification class covering 50.00 % area in the tahsil and three circles characterized by intermediate crop diversification at 37.50% area in the study region while the low crop diversification class covered 12.50 % area in Parner tahsil.

Table 3: Pattern of Crop Diversification (2022-23)

Name of the Tahsil	Index of Crop Diversification	Crops in Competition for Diversification	Area in Hectares	% Area
Palshi	13.38	J+B+P	24615	17.96
Takali Dhokeshwar	18.33	J+B+P+O+OC	20088	14.66
Wadzire	24.82	J+B+P	12333	9.00
Nighoj	38.99	B+O	10688	7.80
Parner	19.03	J+B+P+O	17650	12.88
Supa	20.65	J+B+P+O	17641	12.87
Bhalawani	19.31	J+B+P+O	19699	14.37
Wade Gavhan	27.42	J+P+O	14347	10.47

(Source: By the Researcher)

Note:

J = Jawar B = Bajra W = Wheat
V = Vegetable Os= Oil-seeds P = Pulses
FC= Fodder Crops O = Onion M = Maize

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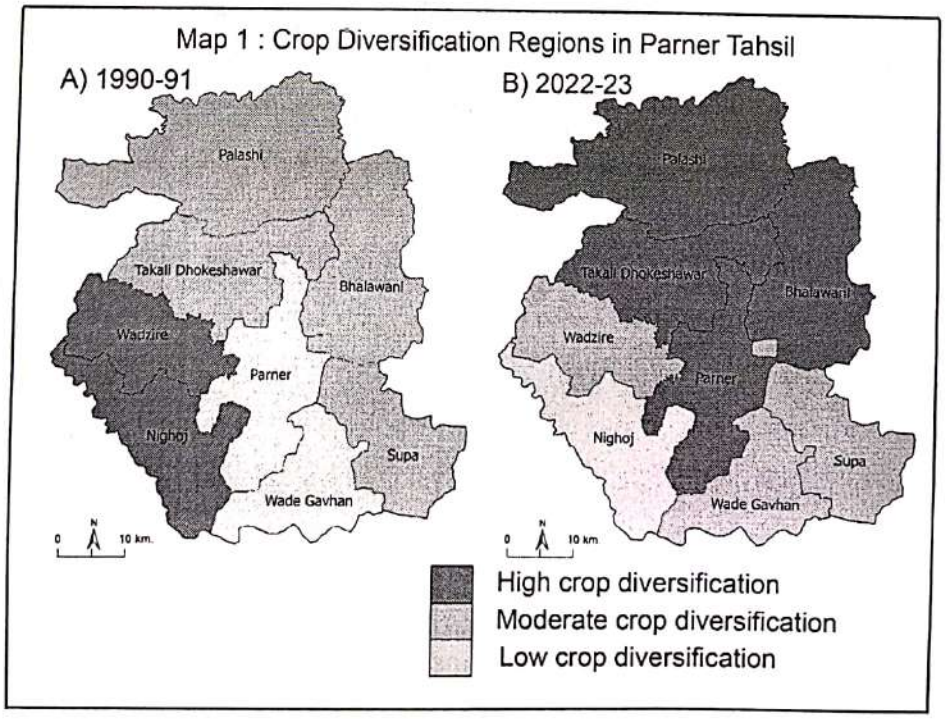
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OC= Other Crops

Following the low levels of crop diversification shown in the circles, two crops—bajra and onion—competed for diversification in the Nighoj circle. The four crops—Jawar, Bajara Pulses, and Onion—that were vying for diversification in the Wadzire, Supa, and Wade Gavhan circles trailed the moderate crop diversification that was noted. In competition for diversification in the Palshi, Takali Dhokeshwar, Parner, and Bhalavani circles in the Parner tahsil was the high crop diversification observed crop and circles, followed by Jawar, Bajra, Pulses, Onion, and other crops (Table 3).

1. Area of High Crop Diversification

18.27% of the area had high crop diversification in 1990–91. The area of high agricultural diversity appeared in Wadzire and Nighoj circles of the tahsil. Two circles, totaling 21,200 hectares, fall under the category of high crop diversification. The crops included in the diversification were Mize, Wheat, Onion, Pulses, Jawar, Bajra, and Other Crops. The four crops—Jawar, Bajra, Pulses, and Onion—competited for diversity in the Wadzire circle, whereas the five crops—Bajra, Wheat, Pulses, Onion, and other crops—competited for diversification in the Nighoj circle. These results indicate the high level of crop diversification observed in the crop and circles.



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This category included 59.87% of the region with strong crop diversification in 2022–2023. The tahsil's Palshi, Takali Dhokeshwar, Parner, and Bhalavani circles are where the area of great agricultural diversification first appeared. There are four circles totaling 82052 hectares under the high crop diversification category. The crops included in the diversification were onion, pulses, bajara, jawar, and other crops. The four crops—Jawar, Bajra, and Pulses—competited for diversification in the Palshi circle, while the five crops—Jawar, Bajra, Pulses, Onion, and other crops—competited for diversification in the Takali Dhokeshwar circle. These results indicate the high level of crop diversification seen in crops and circles. In Parner and Bhalavani circles, there was rivalry amongst the four crops—Jawar, Bajra, Pulses, and Onion—for diversification (Map 1B and Table 3).

2. Area of Moderate Crop Diversification

In 1990–91 and 2022–23, the area covered by moderate crop diversification was 58.87% and 32.34%, respectively. The region of modest crop diversification emerged in all four circles (or sections) of the tahsil in 1990–91. Four circles totaling 68300 hectares fall under the category of moderate crop diversity. The crops included in the diversification were pulses, bajara, and jawar. Palshi, Takali Dhokeshwar, Supa, and Bhalavani circles are the four that have occurred (Map 1 A and Table 2).

The region of modest crop diversification in 2022–2023 can be seen in the tahsil's western half (one circle) and its eastern half (two circles) (Map 5.20.B). Three circles, totaling 44321 hectares, fall within the category of moderate crop diversity. Pulses, onions, bajara, and jawar were the crops grown in the diversification process. Within the tahsil, 20 to 30 indicators of crop diversification were found on Laterite, Radish brown soil tracts with an average annual rainfall of 455–636 mm in the Circles of Wadzire, Supa, and Wade Gavhan. (Table 3 and Map 1 B).

3. Area of Low Crop Diversification

In 1990–1991 and 2022–2023, the area with limited crop diversification was 26523 and 10688 hectares, or 22.86% and 07.80% of the total area, respectively (Map 1 A & B and Table 2 & 3). The poor crop diversification regions first emerged in the southern portion of the tahsil in 1990–1991. Crops including beans, jawar, and bajara are included in this diversification. It first surfaced in the southern region of Tahsil, in the Parner and Wade Gavhan circles (Map 1 A). The western portion of the tahsil, however, is where the poor crop diversification regions emerge in 2022–2023. Onion and Bajara crops are included in this diversification. It was visible in the tahsil's

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Nighoj circle (Map 1B). This region's deep black to medium black soils and 300–600 mm of annual rainfall on average have led to limited crop variety in this area (Map 1B and Table 3).

REMARKS

1. As a result, it can be concluded that a practical technique for classifying circles is the crop diversification strategy based on primary data, which shows the rates of agricultural expansion for each circle.

   1. During the research periods, Parner and Wade Gavhan circles showed evidence of some of the circles classified as having low crop diversification; consequently, the level of changes only Nighoj circle is recorded as having low crop diversification, which means the area of Nighoj circle transfers in a single crop, such as onion.

   2. The moderate diversification was noted in 1990–1991 at Palshi, Takali Dhokeshwar, Bhalawani, and Supa Circle; in 2022–2023, Wadzire, Wade Gavhan, and Supa Circle showed a change in diversification. Micro-irrigation and agricultural development are the causes of these changes.

   2. Wadzire and Nighoj circles had the highest crop diversification in 1990–1991; Palshi, Takali Dhokeshwar, Bhalawani, and Parner circles saw the greatest shift in 2022–2023. Changes in cropping practices in single crops to increased crop yield in study regains are the cause of these alterations.

   Notably, the circles that symbolize Nighoj have developed to a greater extent depending on the values obtained from the Bhatiya Crop diversification procedures. The higher-than-average number of agricultural development indicators may be the cause of this.

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Certificate of Acceptance & Publication

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Signed Ashutosh Agarwal ***Date*** 22-05-2024

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A Study on the Effectiveness of Using Direct Instruction Model on Geometric Figure Drawing Skills in Mathematics Subject of Girl Teachers of Teacher Training School of Akole Taluka.

Dr. Manohar Erande

Assistant Professor, Pu. Ahilyadevi Adhyapak Mahavidyalaya, Sangvi (Su). Tal.Ahmedpur, Dist. Latur.
DOI: https://doi.org/10.55248/gengpi.5.0524.1365

Introduction

The important task of pedagogy is to acquire a systematic knowledge of the process of education and its conditions. The main goal of educational research is to discover the necessary rules, useful methods and principles in the work of improvement related to various aspects of the education sector. There are different levels of education which include lower primary, upper primary, secondary and higher secondary. The objectives of education are determined according to the level of education. To achieve the objectives of education, the curriculum is prepared and various teaching methods and techniques are adopted to convey the components of the curriculum to the students.

Capacity between any two students there are differences in background, personality and physical environment. Not all students can learn the same content, in the same manner, in a fixed period. There is individual variation in them. Students also take different time to respond. Motivation is also different. Hence personal instructions are needed today. Self-study is done by each student according to his own strength, pace and study style. Today it is possible to teach each student independently at his own pace. Various methods and techniques are being developed for this. Every student is expected to study according to his own pace and ability. For that, the arrangement of literature must be complementary to their studies. That is why it is necessary to use different teaching models.

The goals of education are achieved only through classroom teaching. The goals are achieved through teaching at various levels. Goals are long-term goals while objectives are short-term goals. Goals can be reached only through objectives. Objectives are considered in classroom teaching. In the practical field, students were expected to be able to perform precise action skills. E.g. Accurate Sketching (Chavan Kishore, Mathematics Education, Page No. 56,60) Student teachers face difficulties in sketching geometric figures in mathematics. Some student teachers do not acquire the skill of diagramming when teachers teach. Teachers need to teach specially so that all students can learn the skill of drawing geometric figures. Student teachers cannot draw geometrical figures accurately. It is seen that they are not able to structure the composition in the correct order. However, if the school teachers are not properly trained in sketching, then there are shortcomings and mistakes among the students. This creates problems in achieving the basic objectives of diagramming. There is a need to understand those problems and eliminate them in time. For this, the teacher should guide the student teachers in this regard in a proper and timely manner, so that the student teachers will develop an interest in geometric figure drawing.

The presented problem was mainly felt by the researcher while teaching in the teacher's training school. The effectiveness of this technique was felt more than the traditional teaching method while studying based on the Models of Teaching included in the post-graduate curriculum of the year 2008-09. Also, teaching through models can achieve the goal of skill acquisition for every student teacher. From this experience, the researcher chose the presented problem for research and decided to research it. The presented problem was realized by the researcher from his own experience. In this background, the researcher has chosen the said problem for research.

Objectives

1. To assess the geometric figure drawing skills of student teachers.
2. Selecting content with a geometric figure in a mathematics textbook.
3. Teaching geometric figure drawing skills by planning lessons according to the principles of the direct instruction model
4. Examining the effectiveness of using a direct instruction model for student teachers' geometric figure drawing skills.

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Research Method

The present research is expected to establish the correlation between the two variables of teaching and geometric figure-drawing skills with the help of the direct instruction model. Therefore, in the present research, the researcher has used the experimental research method.

There are various variables of experimental research. E.g. Fragmented variable, Unbroken variable, Self-sufficient variable, Sheltered variable, Biological variable, Intermediate variable, the variable that can take two prices, etc. The meaning of these variables must be known. "Any concept that can be expressed in numerical or qualitative values is called a variable."

The only research method that can truly test hypotheses that show causal relationships is the experimental method. One event or symptom is responsible for another event or symptom. A statement that expresses this is a hypothesis that shows a causal relationship. This method is related to the future and the purpose of sponsored research is to find out the causal relationship between two variables by examining the effect of specific changes in the situation. Experimental research is concerned with controlling all external factors and leaving only the factors whose effects are to be studied to see what kind of fruits are produced under these particular conditions.

The present research is related to student teachers in teachers' training schools. The present research aims to study the effectiveness of first-year student teachers in teacher education using a hands-on instructional model for geometric drawing skills in mathematics. That is, it is expected to establish a correlation between the two variables of students' geometric figure-drawing skills and teaching using a direct instruction model. Therefore, it is appropriate to use an experimental method for the present research. Also, for the present research, the functional design of the experimental design and the same group design of the functional design have been selected. Because one group is taught with the help of a direct instruction model and the other group is taught with the traditional method, the effectiveness of students' geometric figure drawing skills is studied through answer tests. Since it requires two equal groups, it is appropriate to use a two-equal group design.

Population

The entire population from which the researcher selects the sample is the population. The population is the people or things that have the same characteristics as the sample. The conclusions drawn at the end of the research from the sample also apply to the population due to the same characteristics. Population can be finite or infinite. In the present research, the population is also of a fixed nature. The population of the present research is first-year student teachers of Marathi medium teacher training schools in Akole taluka.

Information Analysis Tools

The following statistical tools have been used by the researcher to analyze the collected data in the present research. 1. Medium, 2. Standard Deviation, 3. Correlation coefficient and 4. 't' test.

Table No. 1: Tables showing mean and standard deviation of pre-test and post-test.

Statistical Dimension	Pre-test		Post-test	
	Experimental Group	Controlled Group	Experimental Group	Controlled Group
Median	6.40	6.64	17.32	7.24
Standard deviation	3.79	3.53	4.33	3.74

Pre-test Observation

By classifying the scores obtained by the students in the experimental and control groups in the pre-test related to the geometric figure drawing skill in mathematics, the mean of the central tendency and the standard deviation of the deviation have been calculated. The mean and standard deviation of the experimental group are 6.40 and 3.79 respectively and the mean and standard deviation of the control group are 6.64 and 3.53 respectively.

Post-Test

Experimental and controlled reduction related to geometric figure drawing skills in mathematics subject. Based on the coefficient of the post-test, the difference in statistical parameters (mean and standard deviation) was calculated and the mean difference was 10.08 (17.32 - 7.24) and the difference in standard deviation was 0.59 (4.33 – 3.74) is equal to From the above table it is clear that the mean difference between an experimental group and control group post-test is 10.08. This means that the hands-on instruction model is more useful than the conventional teaching method for student teachers' geometric figure drawing skills in mathematics.

t-Test:

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Table No. 2: A table for deriving the t-test

Sr. No.	Statistical Parameters	Experimental group	Controlled group
1	Number of students in group	25	25
2	Pre-test mean	6.40	6.64
3	Standard deviation of pre-test	3.79	3.53
4	Post test mean	17.32	7.24
5	Standard deviation of post-test	4.33	3.74
6	Correlation coefficient	+0.38	

Coefficient Correlation Analysis

The correlation between the experimental group post-test and the controlled group post-test related to the geometric figure drawing skills of the first-year student teachers of Abhinav Shikshan Sanstha Adhyapak Vidyalaya, Akole is +0.38. That is, the correlation between geometric figure drawing skills and teaching through a direct instruction model in mathematics is positive and moderate. From the statistical table t (t-value) for the degree of freedom 24 the sample t-value at the 0.05 level is 2.06 and the sample t-value is 2.79 at the 0.01 significance level.

't'- value interpretation

The obtained 't' value is 11.08 and the df=24 value is 2.06 at 0.05 significance level. The mean difference is significant as the value of the obtained 't' value (11.08) is higher than the value of the sample 't' value (2.06). So the null hypothesis has to be abandoned. The difference between the two mediums is real. Therefore, it is not a problem to say that the teaching done by the researcher through the direct instruction model has a good effect on the geometric figure drawing skill in mathematics. At 0.01 level, sample 't' = 2.79 and the value of the obtained 't' value is greater than the sample 't' value. Therefore, the difference between the two means is significant even at the 0.01 level.

Conclusion

1. The experimental group pretest mean of figure drawing related to geometric figure drawing skill in mathematics subject of first-year female teachers of Abhinav Shikshan Sanstha Abhyapak Vidyalaya, Akole is 6.40. Whereas the pre-test mean of the control group is 6.64. The mean of the post-test of the experimental group is 17.32 and the mean of the post-test of the control group is 7.24. The mean difference between an experimental group and a control group post-test is 10.08. This means that teaching through the direct instruction model shows an increase in the level of proficiency of the student teachers in the geometric figure drawing skills in mathematics.
2. The pre-test standard deviation of the experimental group of figure drawing related to the geometric figure drawing skill in first-year mathematics subject of Abhinav Shikshan Sanstha, Abhinav Shikshan Sanstha Abhyapak Vidyalaya, Akole is 3.79 and the pre-test standard deviation of the control group is 3.53. Also, the standard deviation of the post-test of the experimental group is 4.33 while the standard deviation of the post-test of the control group is 3.74.
3. Based on the mean of the post-test in the experimental and control groups related to geometric figure drawing skills in first-year mathematics subject of Abhinav Shikshan Sanstha Abhyapak Vidyalaya, Akole, the obtained 't' value is 11.08 with 0.05 significance level of sample 't'. The 't' value obtained is significant as it is greater than the value (2.06). The difference between the two mediums is real. From this, it is not acceptable to accept the effect of direct instruction images in the topic "Study of the effectiveness of using direct instruction models for the geometric figure drawing skills of student teachers in Akole taluka teacher training school"
4. The main hypothesis of the present research is that "There is a significant difference in the acquisition of geometric figure drawing skills of student teachers by teaching using traditional teaching methods and direct instruction model".
5. The second hypothesis of the present research is that "there is no significant difference in the acquisition of geometric figure drawing skills of the student teachers due to the teaching done with the traditional teaching method and direct instruction model". Based on the 't' test it can be concluded that the obtained 't' value (11.08) is greater than the sample 't' value (2.06) at 0.05 significance level. From this, it can be said that the said hypothesis is unacceptable.

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Signed Ashwini Agarwal

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The obtained 't' value is 11.08 and the df=24 value is 2.06 at 0.05 significance level. The mean difference is significant as the value of the obtained 't' value (11.08) is higher than the value of the sample 't' value (2.06). So the null hypothesis has to be abandoned. The difference between the two mediums is real. Therefore, it is not a problem to say that the teaching done by the researcher through the direct instruction model has a good effect on the geometric figure drawing skill in mathematics. At 0.01 level, sample 't' = 2.79 and the value of the obtained 't' value is greater than the sample 't' value. Therefore, the difference between the two means is significant even at the 0.01 level.

Conclusion

1. The experimental group pretest mean of figure drawing related to geometric figure drawing skill in mathematics subject of first-year female teachers of Abhinav Shikshan Sanstha Abhyapak Vidyalaya, Akole is 6.40. Whereas the pre-test mean of the control group is 6.64. The mean of the post-test of the experimental group is 17.32 and the mean of the post-test of the control group is 7.24. The mean difference between an experimental group and a control group post-test is 10.08. This means that teaching through the direct instruction model shows an increase in the level of proficiency of the student teachers in the geometric figure drawing skills in mathematics.
2. The pre-test standard deviation of the experimental group of figure drawing related to the geometric figure drawing skill in first-year mathematics subject of Abhinav Shikshan Sanstha, Abhinav Shikshan Sanstha Abhyapak Vidyalaya, Akole is 3.79 and the pre-test standard deviation of the control group is 3.53. Also, the standard deviation of the post-test of the experimental group is 4.33 while the standard deviation of the post-test of the control group is 3.74.
3. Based on the mean of the post-test in the experimental and control groups related to geometric figure drawing skills in first-year mathematics subject of Abhinav Shikshan Sanstha Abhyapak Vidyalaya, Akole, the obtained 't' value is 11.08 with 0.05 significance level of sample 't'. The 't' value obtained is significant as it is greater than the value (2.06). The difference between the two mediums is real. From this, it is not acceptable to accept the effect of direct instruction images in the topic "Study of the effectiveness of using direct instruction models for the geometric figure drawing skills of student teachers in Akole taluka teacher training school".
4. The main hypothesis of the present research is that "There is a significant difference in the acquisition of geometric figure drawing skills of student teachers by teaching using traditional teaching methods and direct instruction model".
5. The second hypothesis of the present research is that "there is no significant difference in the acquisition of geometric figure drawing skills of the student teachers due to the teaching done with the traditional teaching method and direct instruction model". Based on the 't' test it can be concluded that the obtained 't' value (11.08) is greater than the sample 't' value (2.06) at 0.05 significance level. From this, it can be said that the said hypothesis is unacceptable.

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A study of the effectiveness of difficulties encountered in map reading by student teachers in teacher training schools.

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Abstract

Educational research began in England in the nineteenth century. In this research more importance was given to psychological research. Since then many researchers have taken their research work forward academically. The researcher used experimental research method in this research while studying the problems faced by the students in map reading. Through this method, remedial teaching was done to the student teachers on the basis of scale, projection, direction, Symbols and signs and Latitude and longitude. Demonstration work given. This marked a positive change in their map reading. Mean, standard deviation, standard deviation and t-test are used to determine this. Its conclusion can be stated as follows. This means that the calculated 't' value is much more than the calculated value so the research hypothesis, the students can read the maps accurately after implementing the measures developed by the researcher means that t is acceptable.

Keywords: Map reading, Scale, Projection, Direction, Latitude and longitude

I ntroduction

Educational research was first started in Western countries like England and America. In 1896 England Board of Education started psychological research. In 1905, Binet researched the measurement of intelligence. In the year 1916-17, Termanan brought reforms and the foundation of educational research was laid. The goal of education is to create ideal citizens. To achieve this goal the necessary skills should be developed in the student teachers so the student teachers in the teachers' training schools must study the subject of geography which is very closely related to human life. The basic needs of human life include food, clothing, shelter, education, health and recreation. All these things are studied in geography.

The present era is known as the era of technology and competition, progress and of course, as the conflict between humans and the environment on the earth begins, the study of maps becomes important to the study of geography to study the various parts of the new geography. Because the map is the most effective tool in teaching geography. Anyone studying geography must know maps. But map reading has become an important problem in today's teaching. Human life depends on the environment. It is necessary to study geography at the teacher's training college level so that the tendency to use this knowledge to enjoy life is created in the students and so that the study done scientifically and creatively will be useful for them in the future life.

It is necessary to develop observation skills in students through geography. Map reading is a very important and interesting part of geography. Alternatively, students fear it and make mistakes, so it is necessary to study it. A map is the soul of geography. 90% of geography is studied based on maps. That is why in the teacher's training school D.T.Ed. A detailed study of the geography subject for the second year in the curriculum through maps will provide quality education at the primary level. From this point of view, the researcher has chosen the study and solution of this problem in map reading of the teacher education diploma student teacher as it is important for the research.

As the subject of geography is very important to study in daily life, it can be interestingly explained to children. One can travel the world from the own place through the map. Map reading is a very important part of Geography subject. Second-year student teachers make mistakes during the practical work of geography. Also in geography teaching, there was an awareness of the need to achieve more quantitative proficiency in map reading skills. Therefore, if the students become friends with the map in geography at the primary level, they will have the hobby of looking at the map instead of looking at the map, so the researchers think it is important to conduct research based on this topic in the pre-service trainees who are required to serve at the primary level.

Objectives

1. To find out the difficulties faced by student teachers in map reading in teacher training college.
2. Teaching the map.
3. Taking action to solve problems.
4. To verify the effectiveness of activities.
5. Checking the accuracy of editing.

Research Methods

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Considering the objectives of the presented research topic, data collection tools and field, the researchers have adopted the experimental research method. Like all other educational research, the basic purpose of the experimental research method is to find out the dissatisfaction with the prevailing particular educational conditions and to try to remove that dissatisfaction through research.

Experimental Methods

The experiment method is an actual attempt to find solutions to present problems and reduce their magnitude and severity in the future. In the experimental research method, researchers focus on the future. Research continues to be a problem when working within our field of expertise. To reduce them, to reduce their intensity and to reduce their quantity, some measures have to be carefully considered. The researcher has to try to bring about the desired behavior change without harming the subject intellectually, emotionally, physically, or in any other way by any part of the experiment. At the same time, after planning the entire experiment, before starting the actual experiment, by conducting a guided study for small groups, the necessary changes can be made in the planning and action on the actual sample, and the actual sample can be processed more fully.

Experimental Design

Considering which design would be the best for the present research, the control of variables, group design, experimental materials, experimental methods, duration, measurement methods, etc. were considered and the researcher chose the single group design among the different types of functional design in the experimental method, functional and constitutional design.

Single Group Design

In a single-group design, only one group is selected for the experiment. This group is given the same test on two separate occasions and conclusions about the experimental measure are drawn based on the difference. In this design, there are two groups, an experimental group and a control group, one group undergoes two different procedures and the differences between these different procedures are examined. The outline of this design is as follows.

Diagnostic Test

The word clinical is popularized from the word to diagnose. The word diagnosis is widely used in medicine and has importance in pathology and prognosis. Diagnosed and suggested treatment. In the field of education, students are expected to change their behavior through teaching and learning, but sometimes such behavior changes do not happen. The reasons behind it have to be found. A clinical test is a test to find out the difficulties, shortcomings and defects in the progress of the students in teaching.

Remedial Program

A remedial program is a program implemented to find out the problems faced by the students in their studies and eliminate them. 1. The environment, financial, emotional and social status of the students have to be considered. 2. According to the nature of the problem, the students have to be grouped and treated. 3. The help of intelligent students in the class can be taken for the treatment. 4. A remedial program requires the creation and coordination of various educational materials.

Acquisition Test

These tests measure how well a student or class has achieved the course objectives. That test is called the acquisition test. These tests are based on the curriculum and their main purpose is to measure the acquisition of the student after the teaching of its particular component. This test is mainly used to check cognitive level objectives. The acquisition test comes more concerning teachers. Acquisition tests broadly measure the effect of education on logical thinking, clinical evaluation of conclusions, problem-solving skills, and imagination.

Actual Procedure

In exploring what skills are involved in map reading skills, it is important to first explore the various appendages of a map. The aspects of the map from it are as follows.

1. Scale, 2. Projection, 3. Direction, 4. Symbols and signs, 5. Latitude and longitude sample selection

Population

The sample is selected by the researcher. Such a whole is population. A population is a group of individuals or things that have the same characteristics as a sample. The conclusions drawn by the researcher from the sample also apply to the population because of the same characteristics. Population can also be finite or infinite. The population of the present study consists of second-year student teachers in a teacher training college in Maharashtra.

Sample

In the present research, 50 second-year student teachers of Abhinav Adhyapak Vidyalaya Akole have been selected. This sample is selected by a simple random method.

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Pearson correlation coefficient Method Table

Table No. 1: Tables showing the Pearson correlation coefficient Method.

Sr. No.	Pre-test Score	Post-test Score	Deviation from the Mean		Square of Deviation		Product of Standard Deviation
	X	Y	X-M1	Y-M2	X	Y	XY
1	13	24	-1.36	2.04	1.85	4.16	2.77
2	12	23	-2.36	1.04	5.57	1.08	2.45
3	10	20	-4.36	-1.96	19.01	3.84	8.55
4	13	23	-1.36	1.04	1.85	1.08	1.44
5	14	24	-0.36	2.04	0.13	4.16	0.73
6	15	21	0.64	-0.96	0.41	0.92	0.61
7	16	22	1.64	0.04	2.69	0.00	0.07
8	17	24	2.64	2.04	6.97	4.16	5.39
9	12	23	-2.36	1.04	5.57	1.08	2.45
10	18	24	3.64	2.04	13.25	4.16	7.43
11	13	21	-1.36	-0.96	1.85	0.92	1.31
12	10	20	-4.36	-1.96	19.01	3.84	8.55
13	14	24	-0.36	2.04	0.13	4.16	0.73
14	15	23	0.64	1.04	0.41	1.08	0.67
15	20	25	5.64	3.04	31.81	9.24	17.15
16	19	24	4.64	2.04	21.53	4.16	9.47
17	17	23	2.64	1.04	6.97	1.08	2.75
18	18	24	3.64	2.04	13.25	4.16	7.43
19	13	23	-1.36	1.04	1.85	1.08	1.41
20	12	22	-2.36	0.04	5.57	0.00	0.09
21	10	20	-4.36	-1.96	19.01	3.84	8.55
22	14	24	-0.36	2.04	0.13	4.16	0.73
23	15	25	0.64	3.04	0.41	9.24	1.95
24	16	20	1.64	-1.96	2.69	3.84	3.21
25	17	23	2.64	1.04	6.97	1.08	2.75
26	18	24	3.64	2.04	13.25	4.16	7.43
27	19	25	4.64	3.04	21.53	9.24	14.11
28	13	22	-1.36	0.04	1.85	0.00	0.05
29	14	21	-0.36	-0.96	0.13	0.92	0.35
30	11	20	-3.36	-1.96	11.29	3.84	6.59
31	10	20	-4.36	-1.96	19.01	3.84	8.55
32	15	21	0.64	-0.96	0.41	0.92	0.61
33	17	23	2.64	1.04	6.97	1.08	2.75
34	18	24	3.64	2.04	13.25	4.16	7.43
35	19	24	4.64	2.04	21.53	4.16	9.47
36	21	25	6.64	3.04	44.09	9.24	20.19
37	12	23	-2.36	1.04	5.57	1.08	2.45
38	14	24	-0.36	2.04	0.13	4.16	0.73
39	10	20	-4.36	-1.96	19.01	3.84	8.55
40	9	18	-5.36	-3.96	28.73	15.68	21.23
41	8	17	-6.36	-4.96	40.45	24.60	31.55
42	14	20	-0.36	-1.96	0.13	3.84	0.71
43	15	21	0.64	-0.96	0.41	0.92	0.61
44	16	21	1.64	-0.96	2.69	0.92	1.57

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45	17	22	2.64	0.04	6.97	0.00	0.11
46	15	20	0.64	-1.96	0.41	3.84	1.25
47	13	20	-1.36	-1.96	1.85	3.84	2.67
48	10	19	-4.36	-2.96	19.01	8.76	12.91
49	11	18	-3.36	-3.96	11.29	15.68	13.31
50	12	17	-2.36	-4.96	5.57	24.60	11.71
	∑X=714	∑Y=1098			∑X2 =484.10	∑Y2 =234.08	∑XY=316.85

Table No. 2: Tables showing Statistics Dimension.

Sr. No.	Statistics Dimension	Pre-test	Post-test
1	Number of students in group	N_1=50	N_1=50
2	Pretest mean	14.28	21.96
3	Standard deviation of pre-test	3.11	2.16
4	Error as	0.439	0.305
5	The standard error of difference between the two tests is	0.502	
6	Correlation coefficient	r = 0.941	
7	Value of 't'	9.77	

Analysis

49 The degree of freedom at this significance level was found as follows. 2.68 at 0.01 level and 2.01 at 0.05 level. Mean poll calculated 't' value 9.77 Determined 't' value 2.68 at 0.01 level and 2.01 at 0.05 level Calculated 't' value 9.77 determined at 0.01 level in table 't' value for independence quantity 49 is 2.68, while 0 2.01 at the .05 level. This means that the calculated 't' value is much more than the calculated value so the research hypothesis, the students can read the maps accurately after implementing the measures developed by the researcher means that t is acceptable.

Conclusion

Students need to have a good understanding of the basic elements of a map to read maps. Students need to devote plenty of time to map reading. Students need to practice symbolic symbols. A student must practice map reading. Students should be encouraged to visit a geographical place and create a map of it. A map can be read accurately if the observation ability of the students increases.

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To study the Tourist Satisfaction Index of Shirdi tourist Center in Rahata Tahsil, Ahmednagar District, Maharashtra

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ABSTRACT

In today's world, the tourism industry is the largest and most well-known economic sector. This popular industry is fast growing in many parts of the world, opening the path for more growth. The purpose of this paper is to find out what aspects influence visitor contentment and loyalty to devotees and visitors at the existing holy location. Thousands of visitors come from all across India to see this spiritual landmark. In order to evaluate visitor satisfaction and identify current facilities and their level of development, field work was organized to collect tourist views, attitudes, and recommendations recorded in well-designed questionnaires, group discussion, and surrounding personal observations during the field survey. Tourists filled 250 questionnaires in total during the field survey. Using visitor responses that were transformed into arithmetical values, the satisfaction ratings of selected facilities were determined. Based on this assessment, tourist satisfaction levels were divided into four categories: unsatisfactory, satisfactory, good, and extraordinary. With an average score of 26.07 percent, this location's overall satisfaction level is satisfactory. The average of the Shirdi holy site satisfaction index could be useful in future planning and development of this religious tourism attraction.

Keywords: Tourist, Satisfaction Index, Amenities, Personal Rank

I. INTRODUCTION

The history of tourism begins with the history of travel of a man. Travelling on foot, in search of food or for shelter from the forces of nature. The history of travel and tourism helps us in understand how development in the past influenced present-day tourism.

Now days aim of tourism is to make tourists Healthy, Hearty and Happy (Sunetra Roday 2013). Today aeroplanes, ships, motors, bikes and buses are extremely comfortable and high speed, so brought changes in the overall scenario of tourism. Nowadays tourist flow towards tourist destinations is increasing day to day. There are so many tourist centers in all regions to attract tourists. There are different types of tourists found in every tourist place. Therefore the

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study of tourists with functional and behavioural aspects is very important for the development of tourism, as well as the planning of centers. In the assessment of functional and behavioural characteristics of tourist and tourism center in the Shirdi tourism center. Asurvey was conducted for the collection of primary data in the study area.

Shirdi tourism center is religious centers. A sample survey was conducted with designed questionnaires. A random sampling method has been used to select the tourist for interviews and fill the questionnaires by them. For the sample survey, Bimashankar places were selected. Near about 320 tourists were personally contacted and 250 questionnaires were filled up by them at a selected tourist center in the study area.

STUDY AREA

The study area is located in the northern part of the Ahmednagar district in the Rahta taluka. Saibaba temple is located in the village Shirdi. The location of Shirdi tourism centre lies on 19° 46' 0" North latitude and 74° 29' 0" East longitudes in Rahta Tehsil of Ahmednagar district. it is 83 km northwest of Ahmednagar City and 15 km form Kopargaon talukas. Shirdi covers a 759.19 sq k.m.area. It is found at an altitude of 504 meters from M.S.L. Nowadays it's become a famous tourist centre in 1918. Shirdi had 36,004 people living there as of the 2011 India census. The population is made up of 47% women and 53% men. Shirdi has a literacy rate of 70% on average, which is higher than the country's average of 59.5%. Male literacy is 76% while female literacy is 62%. 15% of people in Shirdi are under the age of six.

OBJECTIVE

1. To study the satisfaction indesx of available facilities at Shirdi tourist place and their development.

II. DATABASE AND METHODOLOGY

The level of satisfaction of any person is a state of mind. Many types related to satisfaction were measured by various scholars such as Employee Satisfaction, Job Satisfaction, Customer Satisfaction and also tourist satisfaction. Josef (2000) measures the tourist satisfaction index in his study by using the tourist satisfaction index formula.

The present research was done by using a random sample survey method. Primary data is collected during the fieldwork with the help of questionnaires. The Opening of the tourist fifteen facilities and services is a consideration, such as Accommodation, Transportation, Road conditions, Parking, Food, Drinking Water, Darshan Facility, Public Toilets, Information Center, Shopping Facility, Medical Facility, Cleanliness, Safety, Behavior of Local People and Guide.

The researcher requested to tourists note their satisfaction with both the tourist centers. The tourist was asked to indicate their level of satisfaction concerning every factor Marks by Excellent, Good, Satisfactory and Unsatisfactory. Then these qualitative grades are converted into the quantitative term. The researcher has studied the 280 tourists in Shirdi tourist Centers. They were told to be given a point or mark out of 10 for a particular level of satisfaction. Tourists have given Preference as Good, Satisfactory, Excellent and Unsatisfactory. The researcher has considered numerical values such as (8,9,10) for Excellent,(8,7,6) for Good, (6,5,4) for Satisfactory and (3,2,1)for Unsatisfactory. The average values for the different levels of satisfaction for different factors are calculated by of Calculation of Mean /Average in the table.

These values were multiplied by the respective frequencies, which is given the total satisfaction. The sum was divided by the total frequency for the respective factor, which gives the satisfaction index for that factor. The satisfaction formula was used to measure the tourist satisfaction index. The present research work is completed by research to measure

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the tourist satisfaction index who visited and fill questionnaires in Shirdi tourist center.

Formula :

$$Sti = \frac{\Sigma\ Mi\ Ni}{N}$$

Where,

Sti = Satisfaction Index for the 'i'th Factor

Mi = Numerical value for a particular level of Satisfaction for the 'i'th Factor.

Ni = Number of the respondent deriving a particular level of Satisfaction for the 'i'th Factor.

N = Total Number of Respondents for that factor for all levels of Satisfaction.

In this study, a researcher has tried to measure the satisfaction of tourist facilities and services available at Shirdi tourist center in Pune district of Maharashtra.

ANALYSIS OF SATISFACTION INDEX

The data about the Opinion of tourists regarding the facilities available at the Shirdi tourist center, were collected through the questionnaire. The factor wise level of satisfaction is shown in table No. 1.

Table No. 1: Factor wise Index (MI) of Shirdi Tourist Center

Sr. No.	Factor (Facilities & Services)	Excellent		Good		Satisfactory		Unsatisfactory	
		NO	%	NO	%	NO	%	NO	%
1	Accommodation	55	19.64	84	30.00	92	32.86	49	17.50
2	Transportation	36	12.86	110	39.29	77	27.50	57	20.36
3	Road Condition	40	14.29	45	16.07	133	47.50	62	22.14
4	Parking	36	12.86	52	18.57	128	45.71	64	22.86
5	Food	34	12.14	50	17.86	148	52.86	48	17.14
6	Drinking Water	36	12.86	60	21.43	129	46.07	55	19.64
7	Darshan Facility	64	22.86	106	37.86	74	26.43	36	12.86
8	Public Toilets	32	11.43	48	17.14	117	41.79	83	29.64
9	Information Centre	31	11.07	43	15.36	109	38.93	97	34.64
10	Shopping Facility	45	16.07	57	20.36	134	47.86	44	15.71
11	Medical Facility	35	12.50	48	17.14	100	35.71	97	34.64
12	Cleanliness	46	16.43	96	34.29	89	31.79	49	17.50
13	Safety	40	14.29	110	39.29	85	30.36	45	16.07
14	Behaviour of local People	37	13.21	106	37.86	101	36.07	36	12.86
15	Guide	28	10.00	75	26.79	115	41.07	62	22.14
	Total	**595**	-	**1090**	-	**1631**	-	**884**	-
	Average %	**14.17**	-	**25.95**	-	**38.83**	-	**21.05**	-

Source: Compiled by Researcher

Factor wise level of satisfaction (MI) (Number of tourists as per facilities available for the 'i th' factor.)

The data analysis is presented in table no. 1 shows that out of 280 contact tourists 19.64% of tourists strongly support that Accommodation services are excellent, about 30.00% of tourists said that accommodation services are good, 32.86% of tourists are satisfied with accommodation services, but only 17.50% of tourists are unsatisfactory, with services in Shirdi tourist center.

The tourist who visited Shirdi expressed their opinion about transportation facilities. It shows that about

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12.86 % of tourists Said that transportation facilities are excellent. About 39.29% of tourists said it is good, 27.50% of tourists are satisfied and 20.36% of tourists are not satisfied with these facilities.

The tourist also gave their opinion about road condition facilities. About 14.29% of tourists are Excellent, about 16.07 % of tourists experienced it good, 47.50% of tourists are satisfied and 22.14% are unsatisfactory with road condition facilities. 12.86% of tourists said that parking facilities are excellent, 18.57% of tourists said that it is good, 45.70% of tourists are satisfied with parking facilities and 22.86 % of tourists are not satisfied with these facilities.

The tourist also mentions their opinion about the food facility at Shirdi. About 12.14% of tourists said it is excellent, 17.86% of tourists said it is good, 52.86% of tourists are satisfied and 17.14% of tourists are not satisfied with these facilities. The opinion about drinking water facilities is that only 12.86% of tourists are excellent, 21.43% of tourists said that it is good, 46.07% of tourists are Satisfactory and 19.64 % of tourists are unsatisfactory.

The tourist views about the Darshan facility are different only 22.86% of tourists excellent, 37.86% of tourists felt that it is good, 26.43% of tourists said that it is a satisfactory and 12.86 % of tourists are Unsatisfactory with this services. The tourist views public toilet facilities. About 11.43% of tourists said that it is excellent, 17.14 % of tourists said that public toilet is good, 41.79% of tourists are satisfied and 29.64% of tourists are unsatisfactory with public toilet facilities.

The view about the information center at Shirdi tourist place is that only 11.07% of tourists said that it is excellent. About 15.36% of tourists said that it is good, 38.93% of tourists are satisfied but, 34.64 % of tourists are unsatisfactory with information center facilities. The tourist views about shopping facility are different 16.07% tourist excellent, 20.36% tourist felt that it is good, 47.86% tourist said that it is satisfactory and only 15.71% tourist are unsatisfactory with this services.

The tourist views about medical facility. About 12.50% of tourists said that it is excellent, 17.14% said that medical facilities are good, 35.71% of tourists satisfactory and 34.64% of tourists are not satisfied with medical facilities.

The Opinion about cleanliness facilities that is only 16.43% of tourists are excellent, 34.29% of tourists said that it is a good, 31.79% of tourists satisfied and 17.50% of tourists unsatisfactory. The experienced of safety at the Shirdi tourist center was also noted by the tourist. About 14.29% of tourists said that safety is excellent, about 39.29% of tourists mentioned that safety is good, 30.39% of tourists were satisfied with personal safety and only 16.07% of tourists felt that they are not safe at the Bimashankar tourist center.

The behaviour of local people at the Shirdi tourist center was also noted by the tourist. About 13.21 % of tourists said that the behaviour of local people is excellent. About 37.86% of tourists mentioned that Behavior is good, 36.07% of tourists are satisfied with the Behavior of local people and only 12.86% of tourists are unsatisfied with these services. Out of 280 tourists, 10 % of tourists said that the guide facility is excellent. Only 26.79% of tourists mentioned that it is good, 41.07% of tourists are satisfied with the guide facility and 22.14% of tourists are unsatisfied with the Guide facility in Shirdi Tourist Center.

The researcher analysis the fifteen-factor views about the services and facilities available in the Shirdi tourists place. The tourist opinion about the overall facilities and services at Shirdi are considered with the help of satisfaction index. As per the views of 14.17% tourists reported that all the fifteen Service and Facilities are excellent in Shirdi. 25.95 % of services and facilities are good, 38.83% of tourists are satisfied with all these factors. just only 21.05 % of tourists are not satisfied with all factors (Services and facilities) at the Shirdi tourist Center (See figure No. 1)

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Fig. No. 1: Factor wise Levels of Satisfaction

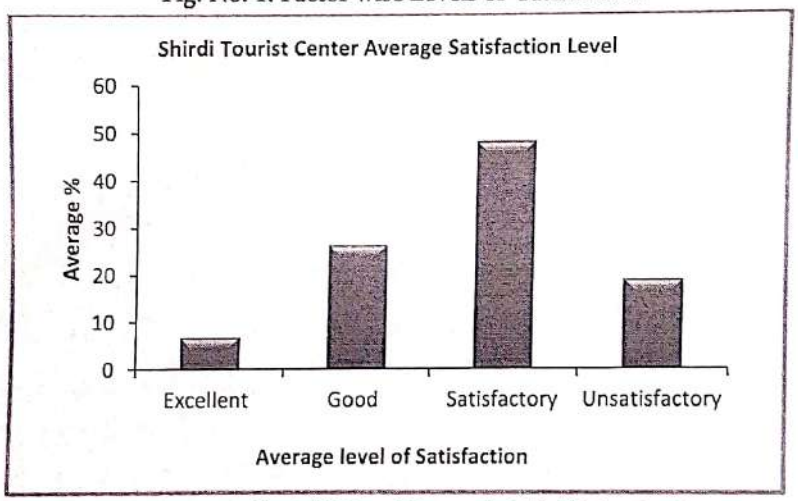


Fig. No. 2: Average % of All Level Factor in Shirdi Tourist Center.

2. Factor wise Average Satisfaction (Ni)

The below Table No 2 show the factor wise average value of satisfaction (NI) The factor wise Average value for the different level of satisfaction were calculated by multiplying these values by respective frequencies, which gives total satisfaction and total satisfaction value is divided by total respondent of the respective factor. Then it gives the satisfaction index for the factor e.g. A Shirdi tourist center. The total number of 55 tourists given their views and these 55 tourists give 8 to 10 points for excellent that total score is 522, So (230 / 55) = 9.49 (show Table No. 2.) It means that the average satisfaction level of the excellent class of tourists is 9.49 for the Accommodation factor.

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Table No. 2: Factor wise Average Value of Satisfaction in Shirdi Tourist Center

Sr. No.	Factor (Facilities & Services)	Average Satisfaction Index (%)			
		Excellent	Good	Satisfactory	Unsatisfactory
1	Accommodation	9.49	7.20	5.02	2.08
2	Transportation	17.97	30.77	30.68	14.56
3	Road Condition	11.95	40.44	25.35	18.06
4	Parking	13.50	16.75	44.73	22.97
5	Food	11.97	17.94	46.08	22.50
6	Drinking Water	12.22	17.07	60.99	15.27
7	Darshan Facility	9.78	20.23	48.84	18.33
8	Public Toilets	17.69	35.81	26.65	12.00
9	Information Centre	10.87	16.19	38.30	27.57
10	Shopping Facility	10.33	14.23	36.40	31.89
11	Medical Facility	15.00	19.42	46.40	13.91
12	Cleanliness	9.57	15.88	33.42	31.14
13	Safety	12.40	32.79	30.53	16.53
14	The behaviour of local People	13.62	37.04	29.06	17.92
15	Guide	12.86	35.36	34.59	10.19

Source: Compiled by Researcher

It is so that from above Table No. 3 that the factor wise satisfaction index with rank for the Accommodation is 6.04, Transportation factor 25.80, Road Condition 24.25, Parking 30.54, Food 32.87, Drinking water 36.33, Darshan facility 25.16, Public toilet 22.85, Information center 28.15, Shopping facility 26.99, Medical facility 26.59, Cleanliness for 23.09, Safety for 26.58, Behavior of local people 28.61 and 27.22 for Guide facilities. These factor wise satisfaction indexes are given weighted by ranks.

Table No. 3: Factor wise Percentage Satisfaction Index with Rank (Sti)

Sr. No.	Factor (Facilities & Services)	Satisfaction Index	Rank
1	Accommodation	6.04	15
2	Transportation	25.80	10
3	Road Condition	24.25	12
4	Parking	30.54	3
5	Food	32.87	2
6	Drinking Water	36.33	1
7	Darshan Facility	25.16	11

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8	Public Toilets	22.85	14
9	Information Centre	28.15	5
10	Shopping Facility	26.99	7
11	Medical Facility	26.59	8
12	Cleanliness	23.09	13
13	Safety	26.58	9
14	Behavior of local People	28.61	4
15	Guide	27.22	6

Source: Compiled by Researcher

$$\text{e.g. Accommodation} = \frac{(55 \times 9.49 + 84 \times 7.20 + 92 \times 5.02 + 49 \times 2.08)}{280}$$

$$= \frac{521.95 + 604.80 + 461.84 + 101.92}{280}$$

$$= \frac{1690.51}{280}$$

Rank = 6.04

The Analysis is given in the above Table No. 3, that the views of tourists about the Drinking water facility in the Shirdi tourist center received 1st Rank. It means that the Drinking water facility is well in Shirdi. It is also Food facilities gets 2nd Rank, Parking 3rd rank, Behavior of local people 4th rank, Information Center 5thrank, Guide 6th rank, Shopping facilities 7th rank, Medical facility 8th rank, Safety 9th rank, Transportation 10th rank, Darshan facility 11th rank, Road condition 12th rank, Cleanliness 13th rank, Public toilet 14th and Accommodation received 15th Rank.

Factor wise Satisfaction Index with rank. Drinking water, Food, Parking, Behavioral of local people, Information center get high ranks (1to5) at Shirdi tourist center. These all factors are very important and play a vital role in the Shirdi tourist center. Tourist place, Drinking water, Food, Parking, Behavioral of local people, Information center are good.

The satisfaction index for Guide, Shopping facility, Medical facility, Safety and Transportation received 6 to 10 rank, while the satisfaction index rank for Darshan facility, Road Condition, Cleanliness, Public toilets and Accommodation received an 11 to 15 rank. it means that the maximum tourist is not satisfied with these facilities at Shirdi tourist center. so it is an urgent need to improve these facilities at Shirdi tourist Center.

III.CONCLUSION

- It is observed that the majority of the local tourist prefer to visit these tourist centers during Ram Navami, Guru Pornima festivals, Cultural Programme and at the time of Annual Fairs.
- It is observed that about 60.21% of tourists not used the Accommodation facility at the tourist center followed by Lodge & Hotel (14.56%).
- It is found that Ahmednagar district is well connected by state and national highways both

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these district maximum tourist centres are connected by District roads.

- The ranking of the satisfaction index at Shirdi has been high for the majority of the factors such as the Drinking water, Food, Parking, Behavioral of local people, Information center etc. The lowest rank of facilities and services like an Darshan facility, Road Condition, Cleanliness, Public toilets and Accommodation facilities.

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Average Agricultural Production of Selected Crops in 1990 to 2015 of Ahmednagar District of Maharashtra State

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ABSTRACT

The present research paper studies and analyze the agricultural productivity at the macro level in the Ahmednagar district. This study is based on secondary data collected from revenue records and district gazetteer offices. Agricultural production was depending on market, demand, physical, climate, socio-cultural, economic, technological and organizational factors. Endeavour is made to study landuse patterns in Ahmednagar district of Maharashtra State for the year 1990-91, this is the normal year for an agricultural phenomenon. The study region covers 1704800 hectares of land the percentage of the state is 5.6% area and has a population of 4543159 in 14 tahsils as per the 2011 Census. Ahmednagar District is located in the western part of Maharashtra State. Physiography, rainfall, soil, temperature, and drainage influence agricultural productivity and land use pattern in this district. Rainfall varies between 200 to 382 mms. The present study represents a real situation of cropping pattern in Ahmednagar district and helps planners and agricultural scientists for agricultural planning at the tahsil level.

KEY WORDS : *Agriculture landuse, Agricultural productivity, Yield of Crop.*

INTRODUCTION

"Agricultural Productivity is the measurement of output and the inputs required to produce that output." In other terms, it is a ratio of input to output. In traditional agricultural productivity measurement, geographers and economists considered inputs such as labour and capital to be costs incurred in the production of agricultural produce. The traditional technique to measuring agricultural productivity, on the other hand, ignores the social and environmental costs associated with food production and livestock keeping.

In today's agricultural productivity measurement, the issue of soil sustainability, ecosystem health, and social acceptability is becoming increasingly significant. Agricultural productivity is determined by the interaction of physical and cultural elements, and it presents itself in terms of per hectare productivity and total production. Where agricultural productivity measurement can assist in determining which areas are working less efficiently than others.

Agricultural plans can be developed to eliminate and minimise regional inequities by delineating zones of low, medium, and high productivity. It also provides an opportunity to establish the ground

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reality, the true cause of an area's or region's agricultural backwardness. Agriculture productivity is the most essential indicator for demonstrating the geographical pattern of agricultural development in the research region.

Researchers, geographers, and economists have created tools and techniques to determine agricultural production in the last decade. The following are some approaches developed and used for measuring agricultural production and agricultural efficiency per unit area. such as output per unit area, production per unit of farm labour, to assess agricultural production as grain equivalents, input-output ratio and ranking coefficient method (Kendall, 1939; Stamp, 1960 and Shafi, 1990).

STUDY AREA

Ahmednagar district is situated partly in the upper Godavari Basin. It lies between $18^0 2'$ North latitude to $19^0 9'$ North latitude and $73^0 9'$ East longitudes to $75^0 5'$ East longitudes. It is surrounded by Nashik district in the North, Beed and Aurangabad districts in the East, Pune district in the South, Thane and Raigad districts in the North-West. Ahmednagar district has an area of 17410 square km and a population is 4543159 (2011 Census). It ranks first in terms of area and sixth in terms of population among the district of the state. The mainstream of hills in the Sahyadri runs north-south in the western proportion of the district. From the main Sahyadrian range, two prominent spurs Stretch out of the east. Baleshwar and Harishchandra range which runs right across the district. It acts as a watershed between the Pravara and its tributaries which drain towards the Godavari. Some of the ranges are flat-topped and regular in height and slope, while others are conical and irregular. The district is broadly divided into three major geographical regions: I) Pravara Basin, II) Dhora Basin and III) The Kukadi Basin. The district is drained by two main rivers, viz. Pravara and the Kukadi and their tributaries. The climate of the district is generally dry except during the South-West monsoon season. The average annual rainfall for the district as a whole is 488.4 mm. Within the district, there are considerable variations in rainfall. The rainfall generally decreases as one proceeds from West to East. The temperature begins to increase rapidly from the latter half of February. May is the hottest month and December is the coldest month with the Maximum temperature at 36.38°C and minimum temperature at 19.92 °C at Ahmednagar. The soil of the district is essentially derived from the Deccan Trap which is the predominant rock formation of the district. The soil formation is mainly affected by the climatic condition and topography of the district. The soil in the Pravara and Mula valleys is quite deep and fertile. The relief in the rest of the district is undulating and susceptible to erosion. The light shallow soil is found on hillslopes and very coarse soils at a higher elevation.

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OBJECTIVES

1. Know the availability of land in Ahmednagar District and its different uses.
2. To study the agricultural productivity in Ahmednagar District from 1990-91 to 2015-16.

DATABASE AND METHODOLOGY

The area and agricultural productivity of covered each crop had converted into a percentage of the total geographical area. Secondary data has been used from Socio-Economic Reviews and District Statistical Abstracts of Ahmednagar District in 1990-91 and 2015-16. The description of each land classification has been supplemented by numerous spot inquiries, besides information embodied by using the Ahmednagar District Census Handbook, District Gazetteer and District Socio-Economic Review of Ahmednagar District.

TRENDS OF AVERAGE YIELD OF SELECTED AGRICULTURALCROP PRODUCTION

Agriculture productivity fluctuations in the percentage share of total crop output allocated to tehsils and districts in the Ahmednagar district. To study the changes in the output of productivity of certain crops in the Ahmednagar district between 1990-1991 and 2015-16. In these two terms years of data, average changes in the production of selected crops are discovered throughout the entire study area. The overall production of chosen crops is shown, with the value increasing and decreasing over the research period. Table No. 1 illustrates the production of wheat, jawar, bajra, pulses, cotton, oilseeds, rice, vegetables, fodder crops, sugarcane, fruits, maize and other crops as well as the variations in the production of wheat, jawar, bajra, pulses, cotton, oilseeds, fodder crops, sugarcane, fruits, maize and other crops. Other products, such as rice, vegetables, sugarcane and maize, are dropping in value by less than 5.0% due to production changes in the Ahmednagar district area.

Table No. 1 indicates the increased value of selected crops, which is extremely high in wheat, jawar, bajra, cotton, oilseeds, fodder crops, fruits, maize and other crops but very low in rice, pulses, sugarcane, vegetables, and total food crops accordingly. All of the information in the preceding table no. 1 and trends of production of the average yield of selected crops are the same.

A) Bajra Production

During the study period of 1990-91 to 2015-16, bajra was also an important crop in the study region. The maximum value of bajra production was found in 700 kg. to 950 kg. per hectare during the study periods totals production in metric tons are 443240 this value is high in 2015-16 years 507091 metric tons are highest production in Ahmednagar district Every farmer and every rural and urban person in the study region uses bajra for domestic food. The average production in metric tons was observed at 58.33% in 1990-91 and 79.17% in 2015-16. The changes in production are positive and this is recorded at 22.32% during study periods.

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B) Jawar Production

Jawar is another important crop grown in the study area. These crops are typically planted by every farmer in the Ahmednagar district. Where are the most prevalent foods used in Ahmednagar district throughout the period and under observation? Every village farmer has harvested these crops throughout the Kharif and Rabbi seasons each year. The variances of these selected crops increased the most during the study period. During the study period, the volume change is 7.90 %, and the overall production of Jawar is close to 65%. Farmers in the Ahmednagar district take the most Jawar production. From 1990-91 to 2015-16, total hectare s of Jawar production were 43260 and 85566 metric tons, respectively. The average production in metric tons was observed at 46.67% in 1990-91 and 65.00% in 2015-16. The changes in production are positive and this is recorded at 14.79% during study periods.

C) Wheat Production

Wheat is the most significant crop in the Ahmednagar district; the area from 1990-91 was recorded at 48523 hectares, while the area under wheat recorded in 2015-16 is 68513 hectares over the study period. The research regions with the largest production and volume of change are investigated from 1990 to 2015. The percentage of production was observed at 25484 tons in 1990-91 and 72260.80 tons in 2015-16. It increased to 46726 metric tons during the study period. The average production in metric tons was observed at 66.67 % in 1990-91 and 126.67 % in 2015-16. The changes in production are positive and this is recorded at 16.23 % during study periods.

D) Oilseeds Production

Oilseed concentrate output in the Ahmednagar district includes (Ground nut, Kardai, Soya bean, Sunflower, and Sesamum). The highest hectare s under the oilseeds production are found in 1990-91, which is 61960 hectare s in agriculture land area, while the lowest production in the study region is found in 2015-16 years, which is 60672 hectare s. During the study region, there is a high volume of negative change in total production and a negative change in total output in metric tons. Farmers have increased their production of ground nuts, kardai, and sesamum to extract useful oil and edible oil for all of us. The production of oilseeds was observed at 2883.2 tons in 1990-91 and 17412.5 tons in 2015-16. It is decreased during study periods. The average production in metric tons was observed at 13.33 % in 1990-91 and 29.17 % in 2015-16. The changes in production are negative and this is recorded at -5.08 % during study periods. As a result, oilseeds are important among all crops investigated during the research region.

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Table No. 1. Average trends rate of production of selected crops 1990-91 to 2015-16 in Ahmednagar district

Sr. No	SelectedCrops	Average production in MetricTones 1990- 91	Average production in MetricTones 2015- 16	Changes in Production between 1990-91 to 2015-16	%
1	Bajara	58.33	79.17	20.83	8.97
2	Jawar	46.67	65.00	18.33	7.90
3	Wheat	66.67	126.67	60.00	25.84
4	Oil Seeds	13.33	29.17	15.83	6.82
5	Pulses	15.00	21.67	6.67	2.87
6	Vegetables	70.83	102.50	31.67	13.64
7	Fodder Crops	46.67	62.50	15.83	6.82
8	Sugarcane	2.17	3.50	1.33	0.57
9	Fruits	52.50	71.67	19.17	8.26
10	Maize	29.17	46.67	17.50	7.54

Source: Computed by the Researcher

E) Pulses Production quotation

In Kharif and Rabbi, the most common food consumed by farmers is pulses. Pulses increased due to changes in agricultural activities between 1990-91 and 2015-16. During the study periods, the average production of pulses is recorded in 1990-91 is 180 tons per hectare while in 2015-16 observed at 260 tons per hectare. Total pulse production in metric tons was higher in 2015-16 than in 1990-91. In the study region, the percentage of pulse crop production is 5.08%, which is higher than the total production per hectare, which is 6.82%. The production of oilseeds was observed at 10346.4 tons in 1990-91 and 8317.4 tons in 2015-16. It decreased by -0.71 % production per hectare during study periods.

F) Vegetable Production

During the study period, vegetable was the cash crop of every farmer in the Ahmednagar district. Vegetables are one of the most important cash crops and valued commodities for farmers in the agricultural sector. This harvest has provided financial support to the farmer; therefore farmers are delighted and satisfied to take this product with their hard work in agriculture. Vegetable crops in Ahmednagar district very high irrigated tehsil produce a very high quantity of vegetables such tehsil as, Sangamner, Rahata and Shrirampur. The area and productivity observed in 1990-91 are 12648 metric tons and 1783.50 metric tons in 2015-16 respectively. The area and production of vegetables decreased

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during the study periods.

Table No.2. Average Yield Per Hectare of SelectedCrops in Ahmednagar District 1990-95 to 2005-10

Sr. No.	Crops	Yield per Hectare inKg.		Production in '000'tones		Volume of Change in %
		1990-91	2015-16	1990-91	2015-16	1990-91 to 2015-16
1	Bajara	700	950	443240	507091	22.32
2	Jawar	560	780	43260	85566	14.79
3	Wheat	800	1520	25848	72260.8	16.23
4	Oil Seeds	160	350	2883.2	17412.5	5.08
5	Pulses	180	260	10346.4	8317.4	-0.71
6	Vegetables	850	1230	12648	1783.5	-3.80
7	Fodder Crops	560	750	54812.8	77685	8.00
8	Sugarcane	26	42	1623.44	1617.42	0.00
9	Fruits	630	860	2866.5	79825.2	26.90
10	Maize	350	560	1417.5	17908.8	5.77

Source: Socio-Economic Abstract of Ahmednagar District (1990-91 to 2015-16)

G) Fodder Crop Production

Farmers raise cattle in addition to growing fodder crops. Crops farmed primarily for animal consumption are referred to as fodder crops. Some fodder crops include hay, grain, and maize. Animal feed is also made from the leftovers from sugar beet processing. The fodder crop production recorded 560 tons per hectare s in 1990-91 while it increased to 750 tons per hectare s in 2015-16. The total production of the fodder corps is 54812.80 metric tons in 1990-91 and 77685 metric tons in 2015-16. The area and production of fodder crops are observed to increase by more than 8.00% during study periods. During the investigation period, the volume of area changes, both positive 6.82 % was recorded.

H) Sugarcane Production

Sugarcane production is primarily for the manufacturing of sugar and 'Gul.' It is a popular crop grown in the study area during observation and field activities. Sugarcane increased by 32117 hectares between 1990 and 2015. The main explanation for this is that these crops have a government value, and the government has given farmers cheap prices, making them unhappy, and production has decreased during the research period. The total production of sugarcane is 1623.44 thousand metric tons in 1990-91

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and 1617.42 thousand metric tons in 2015-16. The area and production of sugarcane are observed to increase by more than 0.57% during study periods.

I) Fruits Production

Fruits concentrate output in Ahmednagar district includes (Mango, Pomegranate, Bananas, Grapes, Custard Apple, Lemon, Orange, Papaya, Watermelon, etc.). The area under the production of the fruit are found 4840 hectare s in 1990-91, which is 18236 hectare s in 2015-16, while the production in the study region is found 2866.50 tons in 1990-91, which is 79825.20 tons recorded in 2015-16. During the study region, there is a high volume of positive change in total production in total output in metric tons. Farmers have increased their production of Pomegranates and grapes. The area and production of sugarcane are observed to increase by more than 26.90% during the study periods.

J) Maize Production

Ahmednagar is well-known for its maize production. In the research area, there are a lot of products under the maize crops. Maize is increasing to the maximum area of hectare s in the district where maize output has been consistent over the last decades, which is 16491.30 metric tons from 1990-91 to 2015-16. This valuable product is always expanding and being distributed to farmers in the research area. Production has increased over the last 25 years, and many farmers are combining these crops with fruit crop production. 5.77% of total maize production was increased found during the study periods.

Development of Average Ariculture Production:

During the study period of Ahmednagar district from 1990-91 to 2015-16, the regional imbalance in agriculture productivity of selected crops was examined. While using this procedure, the following crops were cultivated in the district and were chosen. Jawar, Bajra, Wheat, oilseeds, Pulses, vegetables, Fodder crops, Sugarcane, Fruits and Maize are examples of crops.

According to the table no. 2 the changes of production is calculated and divided into three categories such as;

I. High Productivity
II. Moderate Productivity
III. Low Productivity

I. High Productivity (above 500)

During the investigation periods of 1990-1991 and 2015-16, the selected major crop productivity was observed in this category, which includes the tehsils of Sangamner, Kopargaon, Newasa and Shrirampur which are located in the north Ahmednagar district of the study region. Because of the favorable climatic conditions, heavy rainfall, ideal soil for crop production, and well-built irrigation facilities (wells, tube wells, and canals), and sources to maximize crop production in this region. During

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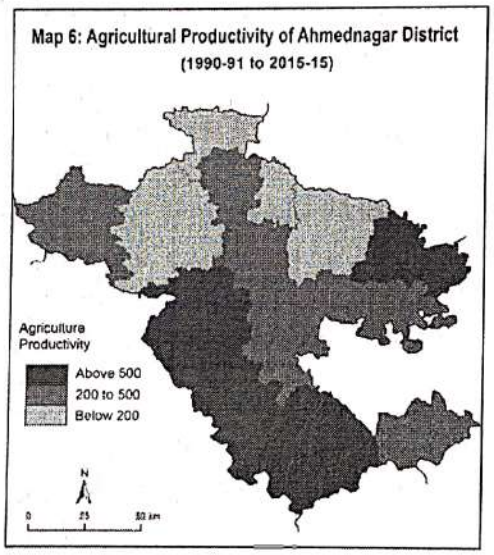
the examination period of 1990-91 to 2015-16, a high productivity area displayed above the agricultural efficiency index is 500 in the region of the Ahmednagar district (Map 6).

II. Moderate Productivity (200 to 500)

During the investigation period, this category of moderate productivity was mostly recorded in the center and southern parts of the Ahmednagar district. Akole, Rahata, Pathardi, Nagar, Rahuri and Jamkhed tehsils had moderate productivity levels of 200 to 500. Because rainfall is minimal in this region, crop yield in this region is determined by soil factors and farmer economic conditions (Map 6).

III. Low Productivity (below 200)

During the study period, Parner, Shrigonda, Shevgaon and Karjat tehsils of Ahmednagar district were included in this group. The irrigation facility in Parner and Karjat tehsil was not developed and was not in excellent working order (Map 6).



Agricultural implements, on the other hand, are ancient and in bad condition due to traditional practices. Rainfall and climatic conditions are also to blame for the combined effect of all these factors, which resulted in low agricultural production (less than 200) in this region from 1990-91 to 2015-16.

CONCLUSION

- The major food crop production is Bajra, Jawar and Wheat. The average productivity of Bajra was recorded at 79.17% during the study periods.
- The highest productivity of food crops recorded is Wheat (126.67%) in 2015-16. The change in production is positive it is observed at 60.00% during study periods while the lowest productivity recorded in the crops was Sugarcane.
- In 1990-91 the largest area and productivity was recorded Vegetables and the lowest was Sugarcane as well as in 2015-16.
- The Percentage of area and productivity is high of Wheat crops and the lowest is Sugarcane observed

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during the study periods.

- In 1990-91, the average productivity is highest recorded for vegetables (850 Kg. per hectare s) as well as the food crops is Wheat crop while the lowest productivity is recorded for Sugarcane (26 metric tons per hectare).
- In 2015-16, the average productivity is highest recorded for Wheat (1520 Kg. per hectare s), as well as cash crops, a Vegetable crop while the lowest productivity is recorded for Sugarcane (42 metric ton hectares).
- The highest positive changes observed in Bajra crops as food crops and fruits are cash crops during the study period.
- The areas of high productivity are recorded in Sangamner, Kopargaon, Newasa and Shrirampur tehsil during study periods.
- The areas of moderate productivity are recorded in Akole, Rahata, Pathardi, Nagar, Rahuri and Jamkhed tehsil during study periods.
- The areas of low productivity are recorded in Parner, Shrigonda, Shevgaon and Karjat tehsil during study periods.
- In the Ahmednagar district northern side of the district are very much developed in irrigation facilities, market, transportation and fertilizers while the southern part of the tehsil observed less irrigation facilities, drought-prone area, and less favorable environmental condition for agricultural development.

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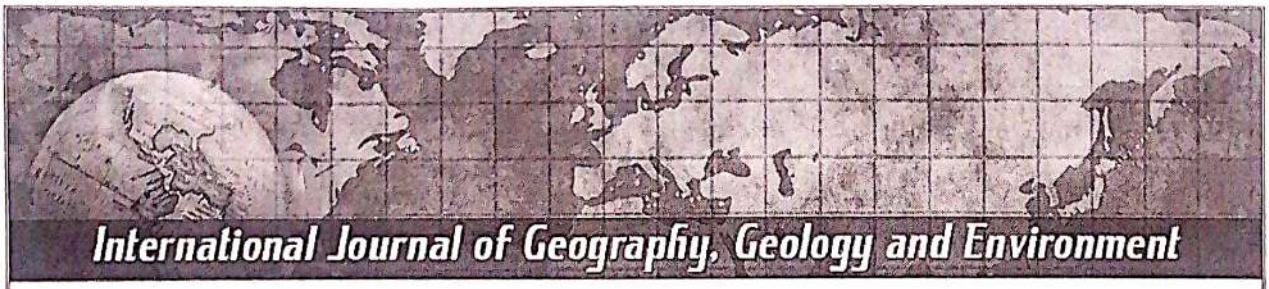
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To study the cost-benefit analysis of cash crops in Sangamner tehsil of Ahmednagar district (MS)

Dr. MR Erande

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Abstract
The present research paper study and analyze the Cost-benefit analysis of cash crops at the macro level in Sangamner tehsil. This study is based on primary and secondary data collected from farmer's revenue records and district gazetteer offices. Cash crop production depended on physical, climate, socio-cultural, economic, technological and organizational factors. The Sangamner tahsil covers 135780 hectares of land and has a population of 487939 in 171 villages as per the 2011 Census. The primary crops under consideration include Sugarcane, Onion, Vegetables and fruits, each analyzed in terms of various farming operations, labor, and input costs. The cost-benefit analysis for irrigated Onion showed a profit of Rs. 328200 per hectare. For irrigated Sugarcane, the profit was Rs. 285700 per hectare. The cash flow analysis revealed the percentage of cash outflows and inflows for each type of crop, helping to understand the income distribution and costs involved.

Keywords: Cash crops, cash in flow, cash outflow, cost benefit analysis

Introduction

The dominant cropping pattern in the tahsil is discussed in the research paper. At this juncture, it seems that the Cost-Benefit analysis of the various crops being grown in the tahsil can provide more insight into the problems faced by the farmers. The cost-benefit analysis was carried out based on the sample survey information. The research paper is mainly devoted to discussing the problems of agriculture and farmers in the tahsil as understood by the primary survey. The survey provides information on parameters related to agricultural benefits and production costs by the current cropping pattern. This and a similar kind of database are used to understand and analyze the spatial distribution.

In the last few years, in various geographical studies, cost-benefit analysis techniques have been used by various geographers and these techniques are enormously useful for the study of agricultural geography, such as Prest and Turvey (1965) [13], Joshi (1985) [14], Saptarshi and Bairagi (1998) [1] and Saptarshi and Bhagat (2004) [15]. The efficient use of available water resources based on technology (Bhagat 2002, and Sonawane 2013) [16, 17], current employment status in rural areas (Jagdale, 2002) [18], assessment of human resource development (Ugale, 2006) [19], a strategy for sustainable development of agriculture, human resource development (Musmade, 2012) [20], cost-effective use of water resources (Sonawane, 2013) [16] and a strategy for groundwater management for sustainable development of agriculture (Chavan, 2014) [21]. The present study aims to find out the availability of water resources for the sustainability of agriculture in the Sangamner tahsil. Hence, the cost-benefit analysis of major cash crops in the tahsil has been carried out. For this, the primary data was collected from at least 100 farmers cultivating each selected crop in the tahsil based on the questionnaire. The sample points have been selected in such a way that they will be well distributed among the villages of the tahsil in a circle-wise manner. Thus, after analyzing the basic database collected from the primary sources, the average values of the price of each crop are obtained. Comprehensive information regarding expenditure is given in the table Table No. 1 to Table No. 16.

Study Area

Sangamner tehsil is located in the western part of Ahmednagar district in the state of Maharashtra. Sangamner is surrounded by Rahata, Rahuri and Kopargaon to the east.

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Sinner tehsil Nashik District to the North. Akole tehsil to the west. Sangamner tehsil to the south-east, Junner tehsil Pune district to the south. The Tehsil 'Sangamner' is located middle part of the bank of the Pravara river. This lies between 19°34′ North 19.57° North to 74°13′ East 74.22° East longitude. It has an average elevation of 549 metres (1,801 ft)from mean sea level Sangamner tehsil is located in the western part of Ahmednagar district. The highest peak, as well as the temple of this tehsil, is Baleshwar. Baleshwar is located in Harichandra Range 15 km from Sangamner tehsil headquarters. Physiography, rainfall, soil, temperature, and drainage influence agricultural land use patterns in this tehsil. Rainfall varies between 200 to 225 mms. The underlined basalt on disintegration and decomposition brought various agents that had yielded three kinds of soils *viz.* Deep black, deep & shallow Alluvial soils in Pravara, Mhalungi and Adhula river basins. These rivers are the main irrigation source of middle tehsil areas. Including five centers of Revenue Circle i.e. Sangamner, Ashwi, Talegaon, Ghargaon and Sakur. The rainfall is mainly due to rain shadow area in terms of the amount of rainfall average receives 416.6 millimeters in the western and middle parts of the tehsil but in the southern part of the tehsil 102 villages are drought-prone areas. Therefore these areas are mostly hilly and unirrigated. The variation in the amount of rainfall & type of soil exerts influence on the cropping pattern of the study region. The major crops namely cereals, cash crops, pulses, oil seeds, fruit crops, vegetables, flower and fodder crops are cultivated in Sangamner tehsil.

Objective

To study the Cost Benefit Analysis for cash crops in Sangamner Tahsil Ahmednagar District of Maharashtra.

Database and Methodology

The study is based on secondary data and field observations. Circle-wise crop data is obtained from village officers' (Talathi) records, APMC Market and Panchayat Samities records in Sangamner tehsil. Topographical maps and survey of India sheets are used for the physiographical study. Landuse data collected from the socio-economical abstract and Ahmednagar gazetteer and district census handbook in Ahmednagar district referred to collect related information.

Methodology

The 171 villages were divided according to 14 Revenue Circles. Information from more than 100 farmers from selected villages in 14 circles of the tahsil has been collected. Well distributed to 14 villages randomly selected according to crop to collect primary information. Expenditure incurred for various operations like tillage, fertilizer, seed, planting, weeding, harvesting, etc. is considered as final charges. A summary of various operations has prepared to understand the cost per hectare for each major crop in the tahsil.

First of all, the cost of major cash crops in the tahsil has been taken into consideration. The first step is to identify the major cash crops in the tahsil. The major cash crops grown are mainly Onion and Sugarcane. Out of the net sown area in the tahsil, only 25.74% of NSA is under irrigation. The highest irrigated area is 58.32% under Well irrigation, Canal 20.43%, Tube well 3.75%, and River 17.50%.

Cost Structure

To understand the cost of each crop based on a sample survey in randomly selected 8.18% of villages, A structured questionnaire has been developed to find out the cost of various operations ranging from planting to harvesting and selling in the market.

Cash Flow Analysis

The total income of the farmer has been analyzed to understand the cash flow after getting the statistics of expenditure on the cultivation of major crops in the study area. This type of cash flow analysis has been done in research over the last few decades (Saptarshi and Kale 1984, Sonawane 2013 and Chavan 2014) [22, 16, 21]. This technique is very useful to understand the economic system as a whole. In the present study, the following factors have been considered to cover the cost of cash flow.

Cash in Flow

1. Wages are given to women worker
2. Wages are given to the male worker
3. Profit margin earned by cultivators.

Cash-out Flow

1. Cost of seeds, fertilizers, and pesticides
2. Cost of packing material brought from the urban sector
3. Cost of fuel such as electric bill, diesel or hiring tractor, and technology

Thus, the share of income that remains in the tahsil and the share that goes out of the tahsil estimated based on expenditure structure. This research has estimated for each village and the tahsil.

Cost of Onion Crop Cultivations

Table 1: Cost of Onion Cultivation

Sr. No.	Operations	Human Power		Labour Cost			Other Cost Rs.	Total Cost Rs.	Per Cent (%)
		Man Days	Women Days	Male Rs.	Female Rs.	Total Rs.			
1	Ploughing	02	00	800	00	800	3000	3800	02.21
2	Harrowing	04	00	1600	00	1600	4500	6100	03.55
3	Sowing / Seedling	05	40	2000	12000	14000	5000	19000	11.06
4	Cost of Seeds	00	00	00	00	00	12500	12500	07.28
5	Electricity Charges	00	00	00	00	00	3000	3000	01.75
6	Fertilizers/ Pesticides	10	00	4000	00	4000	75000	79000	45.98
7	Weeding	00	30	00	9000	9000	2000	11000	06.40
8	Irrigation	25	00	10000	00	10000	00	10000	05.82
9	Harvesting	10	30	4000	9000	13000	5000	18000	10.48
10	Threshing	00	00	00	00	00	00	00	00.00

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11	Packing	06	20	2400	6000	8400	1000	9400	05.47
	Total	62	120	24800	36000	60800	111000	171800	100.00

Source: Field Survey Data (2022-2023).

As discussed in the Onion crop is cultivated in the tahsil during Rabbi and Kharip Season. In the above Table No.1 indicates, the cost of various operations in the field of Onion cultivation has calculated. The figures in the table show that the average total production cost of Onion cultivation is Rs. 171800/-. The total average cost of labor is Rs. 60800/- while the other total expenditure is Rs. 111000/-. The cost structure of the Onion crop shows that most of the cost in various operations is on fertilizers, pesticides seeds, packing, sowing, and harrowing.

Table 2: Output of Onion Cultivation

Sr. No.	Details	Rupees
1	On-farm Price/Kg. Rs.	Rs.20.00/-
2	Grain Production/Hector Kg.	25000 Kg.
3	Grain Production/Hector Rs.	Rs.500000/-
4	Average on-farm price of fodder/Hector Rs.	Rs.00/-
5	Total Earnings/Hector (Grains + Fodder)	Rs.500000/-
6	Total Cost/Hector	Rs.171800/-
7	Net Profit/Hector (Total Earning - Total Cost)	Rs.328200/-
8	Man Days/Hector	62 Days
9	Women Days/Hector	120 Days
10	Daily wages for male workers	Rs.400/-
11	Daily wages for female workers	Rs.300/-

Source: Field Survey Data (2022-2023).

The Table No. 2 indicates that the cost of Onion cultivation is Rs.171800/- per hect. and the net output from the Onion cultivation is Rs.500000/- per hect. The net benefit from the Onion cultivation is Rs.328200/- per hect. The field observation and statistical data show the requirement of employment per hect. Onion cultivation is 62 males and 120 females. In the tahsil during 2022-23, the area under Onion cultivation is 10795 hect. The employment power requirement and generated is 669290 male days and 1295400 female days workers in the tahsil.

Table 3: Cash Flow Analysis of Onion Cultivation

Sr. No.	Cash Flow Analysis	Rupees	Percentage (%)
1	Cash Out-flow	60800	12.16
2	Cash In-flow	111000	22.20
3	Profit	328200	65.64
	Total Income	500000	100.00

Source: Field Survey Data (2021-2022).

It is observed that the profit earned by the farmer due to the cultivation of Onion is about 65.64% (Table No. 3). The cash inflow in the case of Onion is 22.20%. The cash out-flow in Onion cultivation is 12.16%. It shows most of the onion production goes inside the tahsil. Therefore, the tahsil benefits high from onion production as compared to other crops.

Cost of Sugarcane Cultivation

In the above Table No. 4 indicates, the cost of various operations in the field of Sugarcane cultivation has calculated. The figures in the table show that the average total production cost of Sugarcane cultivation is Rs. 119300/- per hector. The total average cost of labor is Rs. 36300/- while the other total expenditure is Rs. 83000/-. The cost structure of Sugarcane crops shows that most of the cost in various operations is on pesticides, fertilizers, seeds, irrigation, and sowing.

Table 4: Cost of Sugarcane Cultivation

Sr. No.	Operations	Human Power		Labour Cost			Other Cost Rs.	Total Cost Rs.	Per Cent (%)
		Man Days	Women Days	Male Rs.	Female Rs.	Total Rs.			
1	Ploughing	02	00	800	00	800	5000	5800	04.86
2	Harrowing	02	00	800	00	800	7000	7800	06.54
3	Sowing/Seedling	20	00	8000	00	8000	2000	10000	08.38
4	Cost of Seeds	00	00	0	00	00	20000	20000	16.76
5	Electricity Charges	00	00	0	00	00	9000	9000	07.54
6	Fertilizers/ Pesticides	15	05	6000	1500	7500	30000	37500	31.43
7	Weeding	04	00	1600	00	1600	10000	11600	09.72
8	Irrigation	44	00	17600	00	17600	00	17600	14.75
	Total	87	05	34800	1500	36300	83000	119300	100.00

Source: Field Survey Data (2020-2021).

Table 5: Output of Sugarcane Cultivation

Sr. No.	Details	Rupees
1	On-farm Price/Kg. Rs.	Rs.2.70/-
2	Grain Production/Hector Kg.	150000 Kg.
3	Grain Production/Hector Rs.	Rs.405000/-
4	Average on-farm price of fodder/Hector Rs.	Rs.00/-
5	Total Earnings/Hector (Grains + Fodder)	Rs.405000/-
6	Total Cost/Hector	Rs.119300/-
7	Net Profit/Hector (Total Earning - Total Cost)	Rs.285700/-
8	Man Days/Hector	87 Days
9	Women Days/Hector	5 Days
10	Daily wages for male workers	Rs.400/-
11	Daily wages for female workers	Rs.300/-

Source: Field Survey Data (2022-2023).

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The Table No. 5 indicates that the cost of Sugarcane cultivation is Rs.119300/-per hect. and the net output from the Sugarcane cultivation is Rs.405000/- per hect. The net benefit from the Sugarcane cultivation is Rs.285700/- per hect. The field observation and statistical data show the requirement of employment per hect. Sugarcane cultivation is 87 males and 05 females. In the tahsil during 2022-23, the area under Sugarcane cultivation is 13930 hect. The employment power requirement and generated is 1211910 male days and 69650 female days workers in the tahsil.

Table 6: Cash Flow Analysis of Sugarcane Cultivation

Sr. No.	Cash Flow Analysis	Rupees	Percentage (%)
1	Cash Out-flow	83000	20.49
2	Cash In-flow	36300	08.96
3	Profit	285700	70.54
	Total Income	405000	100.00

Source: Field Survey Data (2022-2022).

Sugarcane is a good cash crop grown mainly in the southern part of the tahsil and is highly profitable (70.54%). However, cash flow analysis has caught the attention of current workers as cash-outflows (20.49%) and cash-inflows (08.96%) are almost identical or have very little difference.

Cash Flow Analysis

Table 7: Cash Flow Analysis

Sr. No.	Operations	Cash- Out Flow	%	Cash- In Flow	%	Profit	%	Total Income	%
1	Sugarcane	60800	42.28	111000	75.36	328200	53.46	500000	55.25
2	Onion	83000	57.72	36300	24.64	285700	46.54	405000	44.75
Total		143800	100.00	147300	100.00	613900	100.00	905000	100.00

Source: Field Survey Data (2022-2023).

The cash flow analysis technique is very useful for understanding the crop-wise rupee incoming and outgoing in tahsils. The cash flow analysis of cash crops in the study area was revealed in Table No. 7. The cash-out flow is observed higher in the crops is Onion (57.72%) and lower the Sugarcane (57.72%). Also, the cash out flow is higher in the case of crops like Sugarcane (75.36%). The profit is higher in the case of crops like Sugarcane (53.46%).

Conclusion

The research paper discusses the dominant cropping pattern in Sangamner tehsil, Maharashtra, focusing on cost-benefit analysis and agriculture-related problems. The study aims to understand the sustainability of agriculture by analyzing the cost-benefit of major cash crops in the region. Data was collected from over 100 farmers in a sample survey distributed across the villages in the tehsil. The primary crops under consideration are Sugarcane and Onion, and the study distinguishes between irrigated variants of these crops.

Onion

The total cost of irrigated Onion cultivation is Rs. 171800 per hectare, while the total earnings per hectare are Rs. 500000. This results in a net profit of Rs. 328200 per hectare. Employment requirements include 62 male and 120 female workdays per hectare. The study estimates that in 2022-23, 10795 hectares were cultivated with irrigated Onion, generating employment for 669290 male and 1295400 female workers in the tehsil. The cash flow analysis shows that cash inflow is 22.20%, cash outflow is 12.16%, and the profit is 65.64%.

Sugarcane

The total cost of irrigated Sugarcane cultivation is Rs. 119300 per hectare, while the total earnings per hectare are Rs. 405000. This results in a net profit of Rs. 285700 per hectare. Employment requirements include 87 male and 05 female workdays per hectare. The study estimates that in 2022-23, 13930 hectares were cultivated with irrigated Sugarcane, generating employment for 1211910 male and 69650 female workers in the tehsil. The cash flow analysis shows that cash inflow is 08.96%, cash outflow is 20.49%, and the profit is 70.54%.

In summary, the research paper provides a detailed cost-benefit analysis of various cash crops in Sangamner tehsil, highlighting the profitability and employment generation associated with different crops and irrigation practices.

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Effect of AM Fungi on Growth and Yield of Onion (*Allium cepa* L.)

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ABSTRACT:

Important issues in agriculture in the twenty-first century include the need to boost plant immunity, reduce the amount of mineral fertilizers and pesticide/herbicide supplies, and raise crop output and quality. To boost onion productivity, arbuscular mycorrhizal fungi were employed. One of the greatest crucial functions in contemporary agriculture is increasing the economic yield of widely grown crops. From June–July 2023 to September–October 2023 and from November–December 2023 to March–April 2024, pot tests were conducted. During the winter and summer, control and AMs fungus were applied to onion plants. The impact of AM fungus on the growth performance of sensitive species, such as onions, was examined. The role of mycorrhizal fungus and non-AM fungal onion plants was investigated in an experiment. The results showed that the non-AM fungus produced noticeably lower yields than the treated plants. Thanks to the information provided, farmers were able to solve issues regarding the usage of organic fertilizers for increased crop yields. The results of the study demonstrate that when onion crops were vaccinated with AMF, the amount of onions produced rose..

KEYWORDS: AM Fungi, *Allium cepa* L. growth, Fertilizers**.**

INTRODUCTION:

In India, onions (A. cepa L.) are a significant bulb crop. The most popular vegetables in the world are garlic and onions, which belong to the Allium species and have a high

nutritional content and positive impact on human health. **(Golubkina Nadezhda et al., 2020).** It has medicinal qualities and makes a substantial dietary contribution to humans. According to **(Devendra Kumar Kurrey 2018),** India is the second-largest manufacturer in the world. Onion crop yield was found to be impacted by several variables and chemical fertilizers. As a result, the amount of onions produced dropped. Compared to most crop plants, onion plants are more vulnerable to nutrient deficits because of their shallow, unbranched root system. **(Petrovic Bojana et al., 2019).** According to the study, mycorrhizal onion plants had higher fresh bulb weight, dry bulb weight, shoot and root dehydrated weight, and bulb number than non-mycorrhizal onion plants. It is a winter-hardy bulbous plant that is grown every year for bulbs and every two years for seeds. The careless use of chemical fertilizers led to nitrate contamination (NP), organic matter loss (MO), soil erosion (SE), and human health risks (HH) **(Prasad K., 2022).** One of the key elements in raising the yield of vegetable crops, such as onions, is fertilizer. The usage of chemical fertilizers was the subject of earlier research, which demonstrated their detrimental effects on the environment and the health of people and animals. **(Kzier, Ahmed Mhili et al., 2021).** By influencing nutrient intake and cell hydration through increased water use efficiency, arbuscular mycorrhizal fungi typically accelerate the growth rate of their many plants during water scarcity stress **(Nasser Aliasgharzad et al., 2007).** In both well-watered and Am Fungi settings, the study found that mycorrhizal colonization enhances onion growth indices such bulb weight, shoot fresh weight, root fresh weight, shoot dry weight, leaf content and early blubbing, bulb yield, and water consumption in pot culture. **(Bolandnazar, Sahebali 2009)**. Increased phosphorus uptake is one of the most noticeable consequences of mycorrhizal fungal infection on the host plant. This is mostly because mycorrhizal fungi can absorb phosphate from the soil and transfer it to the roots of their hosts. According to **(Z.M. Dar et al. 2018),** PSBs are helpful bacteria that can dissolve inorganic phosphorus from intractable substances. Plants inoculated with AM fungus are said to outgrow

non-inoculated plants when exposed to salt stress **(B. P. Shinde et al., 2017).** According to **(Razia Shuab et al. 2014),** To promote plant development, AMs fungus and plant roots improve the uptake of water and nutrients, such as phosphate, nitrogen, and micronutrients. The toxicity of salt to plants, which reduces their ability to store water, the imbalance in nutrient intake, and the toxicity of ions to plant photosynthesis are the main causes of the well-known low crop yield in saline soil **(Faris Mohammed et al., 2013).** Phenolic compounds, nitrogen compounds, vitamins, terpenoids, and a few more endogenous metabolites are among the many substances found in onions that scavenge free radicals. These molecules provide protection against the onset of cancer, heart disease, neurological problems, and other conditions caused by oxidative stress. **(Anand Kumar et al., 2018).** By improving nitrogen and phosphorus absorption, bio-fertilizers such as Azotobacter and Azospirillum offer an economical and efficient way to improve crop growth, which in turn greatly increases onion production. Moreover, the development cycle of onions is significantly influenced by gibberellic acid (GA3), a vital plant growth regulator **(Himanshu Verma et al., 2023).** Estimating the influence of arbuscular mycorrhizal fungi (AMF) on onion development and yield in two distinct environments/seasons was the aim of this training.

MATERIALS AND METHODS:

The PG Research Laboratory, Department of Botany, J.E.S. College, Jalna, Tal. Jalna, was the site of the experiment. From June–July 2023 to September–October 2023 and from November–December 2023 to March–April 2024, the Pot experiment was carried out. The study aims to ascertain how AM fungi affect the production and development parameters of onions under two distinct situations. The roots of each plant were cleansed with tap water in order to calculate the average length of the longest roots.

The dry and fresh weights were calculated. As soon as the dirt particles were collected and removed from the bulb, the fresh weight of the bulb was determined. A weighing balance

was used to determine the bulb's dry weight. Using a weighing balance and the air drying method, the fresh and dry weights of the roots were determined, along with the shoot length. The quantity of leaves noted for each pot sample.

RESULTS:

Two distinct seasons were used to observe how AM fungus affected the length of the shoots and roots. In the winter season of onion (*A. cepa* L.) treated plants show minimum shoot length (24.13±2.05) in control plants and maximum shoot length (38.13±2.24) in mycorrhizal plants and summer season of onion plants treated observe Minimum shoot length (44.03±2.44) in control plants and maximum shoot length (50.90±1.15) within a mycorrhizal organism. In plants treated with AM fungus throughout the winter, the shortest root length was measured. It was measured in mycorrhizal plants at 6.80±1.65 cm and in control plants at 4.67±0.68 cm. In plants treated with AM fungus during the summer, the shortest root length was measured. It was seen in mycorrhizal plants (7.30±0.56) and control plants (5.73±0.85).

In the winter, the plants treated with AM fungus displayed mediocre leaf count results. There were 7±0.58 leaves on each control plant and 9±1 leaves on each mycorrhizal plant. In the summer, the plants treated with AM fungus displayed mediocre leaf count results. There were 8±0.58 leaves per mycorrhizal plant and 6±1 leaves per control plant. The plants treated with AM fungi showed intermediate results with several roots in the winter season. The number of roots was recorded at the lowest (61±3) per control plant and the highest number of roots (74±1.53) per mycorrhizal plant. The plants treated with AM fungi presented intermediate results with the number of roots in the summer season. The number of roots was recorded at the lowest (60±4.16) per control plant and the highest number of roots (72±4.36) per mycorrhizal plant.

Under various winter and summer conditions, mycorrhizal plants were found to have a higher fresh and dry weight of onion bulbs than control plants. The plants treated with AM fungi presented intermediate results with bulb fresh weight (gm) in the winter season. The bulb fresh weight (gm) was recorded as lowest (61.40±3.55) per control plant and highest bulb fresh weight (gm) (76.84±2.53) per mycorrhizal plant. The plants treated with AM fungi presented intermediate results with bulb fresh weight (gm) in the summer season. The bulb fresh weight (gm) was recorded as lowest (72.16±7.75) per control plant and highest bulb fresh weight (gm) (90.31±2.44) per mycorrhizal plant. The plants treated with AM fungi presented intermediate results with bulb dry weight (gm) in the winter season. The bulb dry weight (gm) was recorded as lowest (54.14±5.55) per control plant and highest bulb dry weight (gm) (68.02±4.68) per mycorrhizal plant. The plants treated with AM fungi presented intermediate results with bulb dry weight (gm) in the summer season. The bulb dry weight (gm) was recorded as lowest (62.96±3.94) per control plant and highest bulb dry weight (gm) (81.36±4.24) per mycorrhizal plant.

For plants treated with AM fungus and kept under control during the winter, the fresh weight of the root (grams) was measured. In control plants, it was recorded at 1.06±0.30 and in mycorrhizal plants, it was 1.58±0.52 observed. The fresh weight (gm) of the root was recorded in plants treated with AM fungi and controlled in the summer season. In control plants, it was recorded at 1.13±0.18, and in mycorrhizal plants, it was 1.32±0.08 observed. For plants treated with AM fungus and kept under control during the winter, the dry weight (gm) of the root was measured. In control plants, it was recorded as 0.26±0.03 and in mycorrhizal plants, it was 0.38±0.007 observed. In summer-controlled plants treated with AM fungus, the dry weight (grams) of the root was measured. In control plants, it was recorded at 0.35±0.09 and in mycorrhizal plants, it was 0.40±0.09 observed.

The shoot fresh weight (gm) was also observed considerably lower in control plants at 11.96±3.53gm, and 32.11±9.13 gm while lower in control plants in the winter season. The shoot fresh weight (gm) was also observed considerably lower in control plants 27.38±3.06 gm, and 36.77±2.59 gm while lower in control plants in the summer season. The shoot dry weight (gm) was also observed considerably lower in control plants 2.88±1.67gm, and 7.65±0.73 gm while lower in control plants in the winter season. The shoot dry weight (gm) was also observed considerably lower in control plants 4.17±0.61 gm, and 6.58±0.84 gm while lower in control plants in the summer season.

Table- Effect of AM fungi on Shoot Length and Root length at two different seasons

Season	Treatments	Shoot Length (cm)	Root length (cm)
Winter	Control	24.13±2.05	4.67±0.68
	Mycorrhiza	38.13±2.24	6.80±1.65
Summer	Control	44.03±2.44	5.73±0.85
	Mycorrhiza	50.90±1.15	7.30±0.56

The mean ± standard deviation is used to present the data. Three replicates (N=3) were used to determine the means for shoot length (cm) and root length (cm).

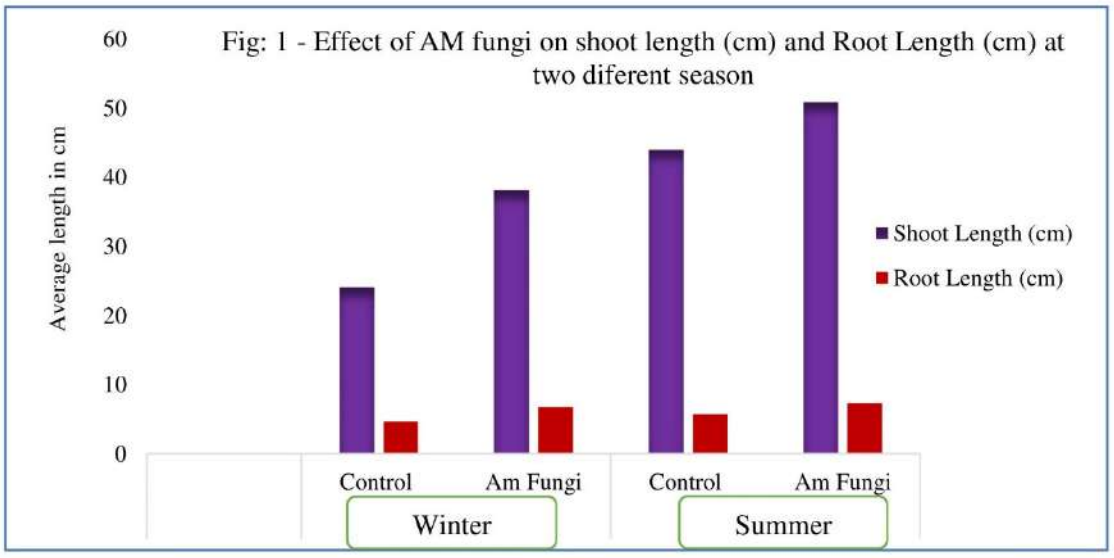


Table: 2 - Effect of AM fungi on the Number of Roots and Number of Leaves at two different seasons

Season	Treatments	Number of Roots	Number of leaves
Winter	Control	61±3	7±0.58
	Mycorrhiza	74±1.53	9±1
Summer	Control	60±4.16	6±1
	Mycorrhiza	72±4.36	8±0.58

The mean ± standard deviation is used to present the data. Three replicates (N=3) of the number of roots and leaves were used to calculate the means.

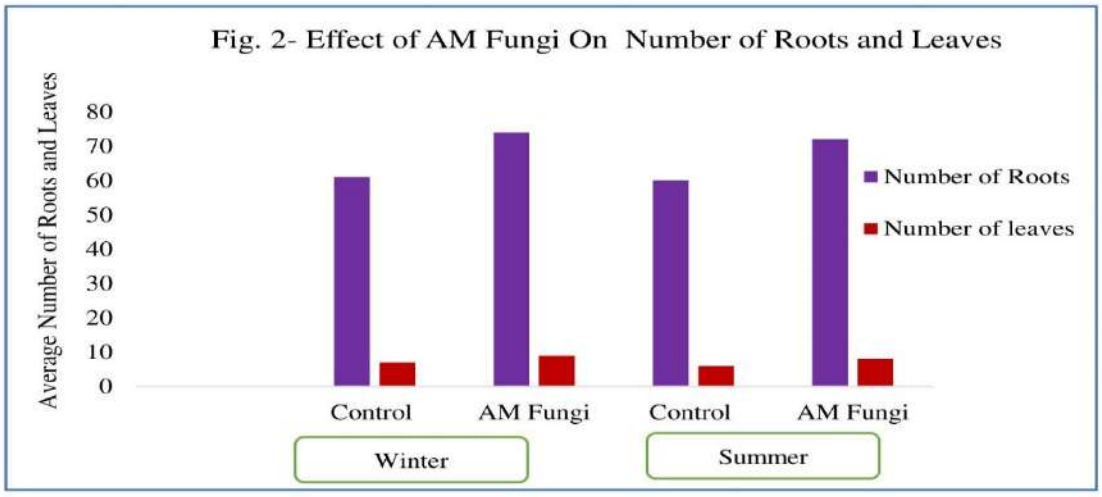


Table: 3 - Effect of AM fungi on Shoot fresh wt. (gm) and Shoot dry weight (GM) at two different seasons

Season	Treatments	Shoot Fresh Wt. (gm)	Shoot Dry Wt. (gm)
Winter	Control	11.96±3.53	2.88±1.67
	Mycorrhiza	32.11±9.13	7.65±0.73
Summer	Control	27.38±3.06	4.17±0.61
	Mycorrhiza	36.77±2.59	6.58±0.84

The mean ± standard deviation is used to present the data. Three replicates (N=3) of the Shoot Fresh Wt. (GM) and Shoot Dry Wt. (GM) were used to determine the means

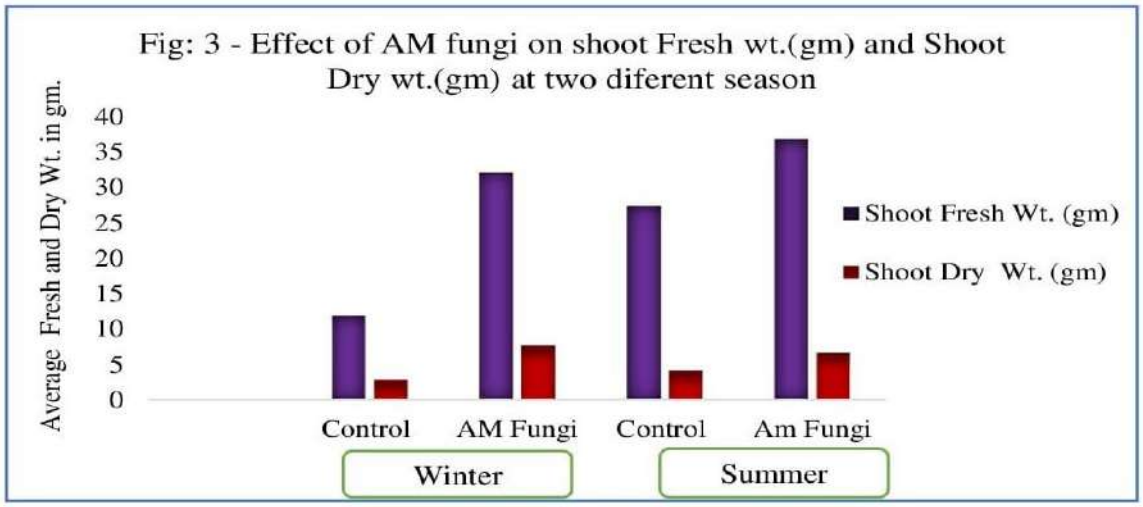


Table: 4 - Effect of AM fungi on Root Fresh wt.(gm) and Root Dry wt.(gm) at two different seasons

Season	Treatments	Root Fresh Wt. (gm)	Root Dry Wt. (gm)
Winter	Control	1.06±0.30	0.26±0.03
	Mycorrhiza	1.58±0.52	0.38±0.07
Summer	Control	1.13±0.18	0.35±0.09
	Mycorrhiza	1.32±0.08	0.40±0.09

The mean ± standard deviation is used to present the data. Three replicates (N=3) of Root Fresh Wt. (GM) and Root Dry Wt. (GM) yielded the means.

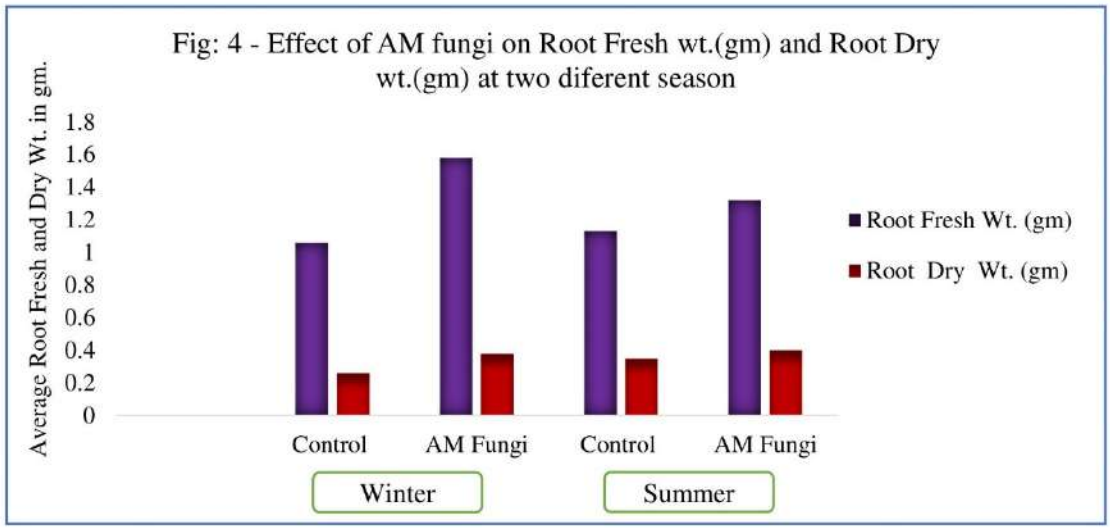
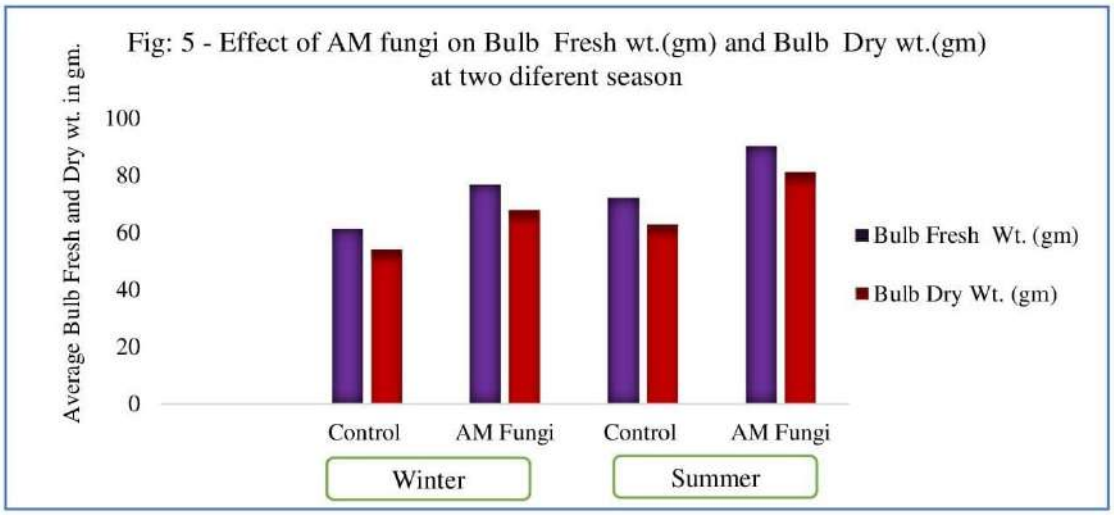


Table- Effect of AM fungi on Bulb Fresh wt.(gm) and Bulb Dry wt.(gm) at two different seasons

Season	Treatments	Bulb Fresh Wt. (gm)	Bulb Dry Wt. (gm)
Winter	Control	61.40±3.55	54.14±5.55
	Mycorrhiza	76.84±2.53	68.02±4.68
Summer	Control	72.16±7.75	62.96±3.94
	Mycorrhiza	90.31±2.44	81.36±4.24

The mean ± standard deviation is used to present the data. Three replicates (N=3) of the Bulb Fresh Wt. (gm) and Bulb Dry Wt. (gm) yielded the means.



DISCUSSION:

After the samples were dried to constant weight at 60°C in a hot air oven, the plants were removed. The height of both healthy and sick plants was then measured, along with the dry biomass of the shoots, roots, and bulbs. **(Leta Ararsa et al. 2013).** In mycorrhizal plants, the number of leaves, root length, and leaf length all grew over 60 days, while in non-mycorrhizal plants, these variables decreased **(S.K. Shinde et al., 2016).** It is believed that AMF can reduce the high rate of fertilizer application needed to produce a large yield of onions. **(Abdullahi R. et.al., 2013).** According to **(Razia Shuab et al. 2014),** The pot culture demonstrates that the

right circumstances for growth and general development are satisfied both with and without the arbuscular mycorrhizal fungus spores. After the plants were uprooted and the samples were dried in a hot air oven at 60 °C to a constant weight, measurements were made of the height of both healthy and diseased plants as well as the dry biomass of the shoots, roots, and bulbs.. **(Leta Ararsa et al. 2013).** In mycorrhizal plants, the number of leaves, root length, and leaf length all grew over 60 days, while in non-mycorrhizal plants, these variables decreased **(S.K. Shinde et al., 2016).** AMF is thought to have the ability to lower the high fertilizer application rate required to generate a high yield of onions **(Abdullahi R. et al., 2013).** According to **(Razia Shuab et al. 2014),** To describe effects with and without arbuscular mycorrhizal fungal spores, the pot culture demonstrates that the necessary circumstances for growth and general development are met.

CONCLUSION:

The current study found that AMF colonization improved the overall growth and development of the onion plant. The study shows that the AMF increased onion growth and yield. According to this study, AMF colonization enhanced an onion plant's overall development and growth. The findings of the study, the AMF boosted onion yield and growth. Arbuscular mycorrhizal fungi were used to increase onion yield. Pot experiments showed that non-AM fungal onion plants yielded less than treated ones. This information helps farmers solve problems related to organic fertilizer use and improves crop production. Inoculation with AMF increased onion yield.

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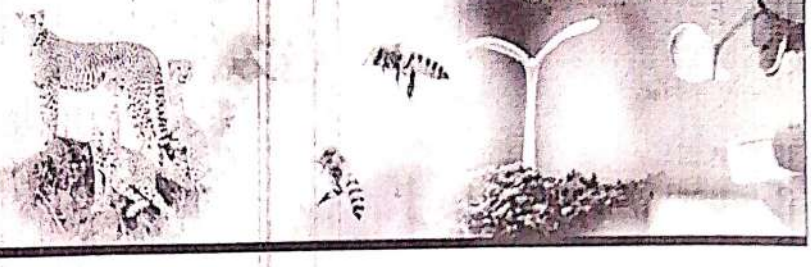
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Study on Antimicrobial Activity of *Sapindus trifoliates* L.

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ABSTRACT

Sapindus trifoliates L. is an extremely valuable medicinal plant distributed in tropical and subtropical regions of Asia. Plant extracts appear to be one of the better alternatives as they are known to have a minimal environmental impact and danger to consume in contrast to synthetic pesticides. The seed extracts of *Sapindus trifoliates* L. exhibited activity against *Bacillus subtilis*, *Bacillus cereus*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*. The antimicrobial activity of each plant extract was tested against bacterial and fungal organisms i.e. *Bacillus subtilis*, *Bacillus cereus*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *E. coli*, *Aspergillus niger*, *Aspergillus flavous* and *Fusarium* spp.

The antimicrobial activity was done for Chloroform, Ethyl Alcohol, Petroleum Ether, Acetone and Aqueous extracts. The ethanol extract showed antifungal activity against *Aspergillus fumigates* and *Aspergillus niger* at 100% plant extract. The inhibitory activity of the various seed extracts like Chloroform, Acetone, Petroleum ether, Ethyl alcohol and aqueous were observed.

Keywords: Antimicrobial Activity, *Sapindus trifoliates* L., Soxlet Extraction.

INTRODUCTION

Medicinal plants are important sources of potentially useful new compounds for the development of chemotherapeutic agents. The genus Sapindus belongs to the family Sapindaceae. The major compounds isolated from genus sapindus are saponins, triterpenoids, fatty acids, and flavonoids are well known for their antimicrobial, antidiabetic, cytotoxic, molluscicidal, fungicidal and inflammatory activities. **(Sharma A. et.al 2011.).**

The seeds of *Sapindus mukorossi* L. are used in Ayurvedic medicine to remove tan and freckles from the skin **(Aparna Upadhyay & D.K. Singh 2012).**

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The first step towards this is the screening of plants used in medicine. Hence antibacterial research is going towards the discovery and development of antibacterial and antifungal agents. The screening of plants for their biologically active principles is done based on chemo-taxonomic investigations or ethno botanical knowledge of a particular disease **(Sohni YRet.al., 1995)**.

Phytochemical work on different parts such as Fruit, Pericarp, Seeds, Leaves, Ripe Fruit, Roots, and Stems of *Sapindus mukorossi* L., *Sapindus saponaira* L. and *Sapindus trifoliatus* L. **(Ibrahim 2015)**.

Due to increasing price of chemical drug, it is a need to find out cheaper drugs from natural resources. In recent years more species have been evaluated for their antimicrobial activity. The medicinal plant *Sapindus trifoliatus* L. is selected for the present study and is aimed at screening the antimicrobial properties against the selected pathogenic bacteria and fungal organisms. Dry seeds of *Sapindus trifoliatus* L. are one of the oldest cultivated medicinal plants in the world. In fact botanists traced it to the period of Vedas about 5000 years ago. **(Aruna Pai 2014)**.

It is a medium size deciduous tree growing wild in South India. Fruits of *Sapindus trifoliatus* L. are rich in saponins. The seed is also used in Ayurvedic medicine to remove freckles and tan from the skin and for cleansing hair. The major compounds isolated from the plants are triterpenoids, fatty acids, steroids, alkaloids, carbohydrates, saponins, and flavonoids. They are also known for their antidiabetic, fungicidal, anti-inflammatory, antimicrobial and cytotoxic activities. **(S.Priya1 and M. Mohanapriya 2021)**.

Sapindus is a genus of about five to twelve species of shrubs and small trees, native to warm temperate humid regions. The genus includes together deciduous and evergreen species. The members of the genus are commonly known as soap berries or soap nuts because the fruit pulp is used to make soap. The fruits are solitary globose and appear in the month of July-August. Experiments demon-starting the physiological, immunological and pharmacological properties of saponins have stimulated considerable clinical interest in these substances **(Denise D. Pelegrini ET. Al 2008)**.

The *Sapindus trifoliatus* L. is a large, deciduous tree with a straight trunk up to 12 m in height, sometime attaining a height of 20 m and a girth of 1.8 m, with a globose crown and rather fine leathery foliage. Leaves are 30 to 50 cm long, alternate, paripinnate; common petiole very narrowly bordered, glabrous; leaflets 5-10 pairs, opposite or alternate, 5-18 by 2.5-5 cm, lanceolate, acuminate, entire, glabrous, often slightly falcate or oblique; petioles 2-5 m long. Seeds are 0.8 to 1.3 cm in diameter, globoose, smooth, black and loosely placed in dry fruit **(M. Rajeshwari et.al 2016)**.

The fruit is valued for the saponins (10.1%) present in the Pericarp which founds up to 56.5% of the drupe known for inhibiting tumor cell growth. **(Varsha Parcha et. al. 2020)**. The fruit contains an active principle Saponin which ranges from 6-10 % of mass weight. The plant has been reported for its high content of Saponin and Sugar **(Azhar I. et. al., 1994)**. Saponins are glycoside compounds and have many biological properties like hemolytic and antimicrobial effects. **(Meltem**

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Mert Eren et.al. 2021). It is used to treat various diseases by Ayurveda is traditional physicians. Knowledge on medicinal uses of *Sapindus trifoliatus* L. is scattered. (E.R.H.S.S. Ediriweera et. al. 2021). The present study focused on Antimicrobial activity and Antifungal activity.

MATERIALS AND METHODS

Collection of Plant Material:

Seeds of *Sapindus trifoliatus* L. were collected from the local market. The Pericarp of Fruits was shade dried at room temperature for 25-30 days and crushed into the grinder.

Preparation of plant extract:

25 gm powder of plant material was sequentially extracted with different solvents in the Soxlet apparatus. The solvent used for extraction included Chloroform, Acetone, Petroleum Ether, Water and Alcohol. The respective extract was dried in Petri plates using the electrical oven at 50°C for 2-4 days to field solid semi-solid residue working extract was prepared by adding it to DMSO solution at a concentration of 25gm ml.

Soxlet Extraction of *Sapindus trifoliatus* L.:

For the extraction of *Sapindus trifoliatus* L., the crushed seeds Pericarp are used. In a Soxlet apparatus, the extraction thimble is fitted in between a round bottom flask at the bottom and a bulb condenser at the top. Inside the thimble holder solid matrix seed is wrapped within the packing. The packed bed is in contact with pure solvent for the extract to be transferred from the solid matrix to a fluid medium and the extract is leached out. The mass transfer occurs during solvent extraction in a packed column.

Antimicrobial assays:

The antimicrobial assays were carried out by Antibacterial activity of plant extracts were carried out against bacterial pathogens, such as E.coli and *staphylococcus aureus* using agar well diffusion method.

Disc diffusion method:

A sterile filter disc (diameter -4 mm, Whatmann paper No.-3) was placed in Petri dishes filled with Mueller Hinton agar and seeded with 0.3 ml of the test organism. The disc was impregnated with the test concentration of the compounds investigated dissolved in DMSO. The zones of growth inhibition around the disc were measured after 24 hrs of incubation at 37°C. Each microorganism was tested in triplicate and solvent was used as a control.

Micro dilution Method:

The method micro dilution method/technique was used to obtain quantitative data for the compounds investigated. Bacterial species were cultured overnight at 37°C in and LB medium. The inoculums suspension was adjusted with sterile saline to a concentration of approx. 1.0 $x10^5$ in a final volume of 100 µl /cell. The fungal spores were washed from the surface of agar plates with sterile 0.85% saline containing 0.1% in 80 (vol. /vol.) and adjusted with sterile saline to a concentration of 1.0 X 10^5 in a final volume of µl/ml. The inoculation was stored at 4°C for further use. Dilution of the inoculate was cultured on solid MH for bacteria and MA for fungi to verify the absence of contamination and to check the validity of the inoculums.

Evaluated Method:

To suggest methodologists for screening the natural products' antimicrobial activity, two different

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qualitative methods were evaluated by the agar diffusion test and the Bio autographic method.

Agar diffusion well method:

The bacterial inoculums were uniformly spread using a sterile cotton swab on a sterile Petri dish MH a garnon-sterile dilution yielded a concentration of 100, 80, 60, 40, 20, 10, 5, and 1.25 mg ml. for pure substances 50 µl. of natural products were added to each of the 5 wells. The system is incubated for 24 hrs at 36°C – 1° C under aerobic conditions. After incubation confluent bacterial growth was observed. Inhibition of bacterial growth was observed and measured in mm. Agar diffusion disc method. Natural products were dissolved and diluted with solvents as mentioned previously. The same no. of subsequent diluted was performed as described above. However, natural products serial dilution was performed out of initial conc. 2.5 greater than the ones performed for the good method. 7mm filter paper dishes (No.3) were impregnated with 20ml of each of the different dilutions. The dises were allowed to remain at room temp unit for complete dilute evaporation and kept under refrigeration until ready to be used.

Aseptic condition:

An aseptic chamber that is laminar airflow was cleaned with 70% ethanol and irradiated with short-wave ultraviolet light and the empty Petri plates were sterilized in an autoclave. MH agar media were poured into plates in a sterile environment and allowed to cool at room temperature. At the same time spread 0.1 ml of a suspension of test organism on the surface of the sterile MH agar with the help of a spreader in a zig-zag manner and wells were made with the help of a borer. Four well made in each other. Add 100 µl. of different concentrations of plant extract in two well in each other and another one having DMSO solution and another antibiotic. Keep the plate at 37°C for incubation for at least two days to allow diffusion in extract through agar. Measure the diameter of the zone of inhibition of the test organism in presence of different plant extracts.

RESULTS AND DISCUSSION

Antimicrobial activity:

The antimicrobial activity of plant extracts was tested by the good diffusion method. The antimicrobial activity of each plant extract was tested against bacterial and fungal organisms i.e. *Bacillus subtilis, Bacillus cereus, Staphylococcus aureus, Pseudomonas aeruginosa, E.coli, Aspergillus niger, Aspergillus flavours and Fusarium spp.*

Antibacterial activity:

The seed extracts of *Sapindus trifoliatus* L. exhibited activity against *E. coli, Pseudomonas aeruginosa, Bacillus subtilis* and *Staphylococcus aureus*. The inhibitory activity of the various seed extracts like Chloroform, Acetone, Petroleum Ether, Ethyl Alcohol and Aqueous were also observed. The chloroform extracts of *Sapindus trifoliatus* L. showed less in *Pseudomonas aeruginosa* (6.03mm) and highest in *Bacillus subtilis* (8.06 mm) zones of inhibition at 100µl. The Ethyl alcohol extracts of *Sapindus trifoliatus* L. showed less in *Pseudomonas aeruginosa* (7.01mm) and highest in *E.coli* (9.09 mm) zones of inhibition at 100µl. The Petroleum ether extracts of *Sapindus trifoliatus* L. showed less in *Pseudomonas aeruginosa* (6.09mm) and highest in *Staphylococcus aureus* (8.08 mm) zones of

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inhibition at 100µl. The Acetone extracts of *Sapindus trifoliatus* L. showed less in *Pseudomonas aeruginosa* (6.09mm) and highest in *Staphylococcus aureus* (8.08 mm) zones of inhibition at 100µl. The Aqueous extracts of *Sapindus trifoliatus* L. showed less in *Pseudomonas aeruginosa* (7.03mm) and highest in *E.coli* (11.03 mm) zones of inhibition at 100µl.

Table1: Antibacterial activity of *Sapindus trifoliatus* L.

Sr. No.	Type of extract	Diameter of zone of inhibition(mm)			
		E.coli	*P.aeruginosa*	*B.subtilis*	*S.aureus*
1	Chloroform	7.8	6.3	8.6	8.3
2	Ethyl Alcohol	9.9	7.1	9	9.3
3	Petroleum Ether	8.5	6.9	7.9	8.8
4	Acetone	8.3	6.8	7.1	8.6
5	Aqueous	11.3	7.3	10.2	9.8

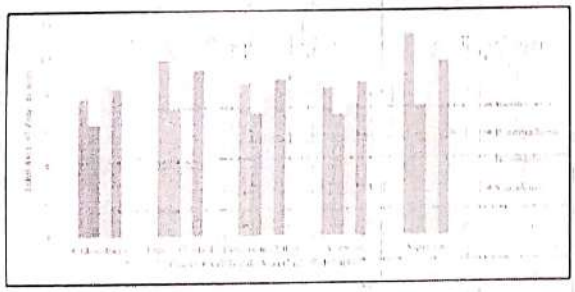


Fig. No.01: Graphical Representation shows Antibacterial activity of *Sapindus trifoliatus* L. by using different extract

Antifungal activity:

The seed extracts of *Sapindus trifoliatus* L. exhibited activity against *Aspergillus niger*, *Aspergillus flavous* and *Fusarium spp.* The inhibitory activity of the various seed extracts like Chloroform, Ethyl Alcohol, Petroleum Ether, Acetone and Aqueous were also observed. The chloroform extracts of *Sapindus trifoliatus* L. showed less in *Aspergillus niger* (7.06 mm) and highest in *Aspergillus flavous* (9.09 mm) zones of inhibition at 100µl. The Ethyl alcohol extracts of *Sapindus trifoliatus* L. showed less in *Fusarium Spp.* (9.08 mm) and highest in *Aspergillus flavous* (11.02 mm) zones of inhibition at 100µl. The Petroleum ether extracts of *Sapindus trifoliatus* L. showed less in *Aspergillus niger* (7.09mm) and highest in *Fusarium Spp.* (9.04 mm) zones of inhibition at 100µl. The Acetone extracts of *Sapindus trifoliatus* L. showed less in *Aspergillus niger* (8.01mm) and highest in *Aspergillus flavous* (9.03mm) zones of inhibition at 100µl. The Aqueous extracts of *Sapindus trifoliatus* L. showed less in *Fusarium Spp.* (11.02 mm) and highest in *Aspergillus niger* (12.02 mm) zones of inhibition at 100µl.

Table 2. Antifungal activity of *Sapindus trifoliatus* L.,

Sr. No.	Type of extract	Diameter of zone of inhibition(mm)		
		Aspergillus niger	*Aspergillus flavous*	*Fusarium Spp*
1	Chloroform	7.6	9.9	9.3
2	Ethyl Alcohol	10.9	11.2	9.8
3	Petroleum Ether	7.9	9.1	9.4
4	Acetone	8.1	9.3	8.9
5	Aqueous	12.2	11.7	11.2



Fig. No.02: Graphical Representation shows Antifungal activity of *Sapindus trifoliatus* L. by using different extracts

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CONCLUSION:

Present study has concluded the fact that the antimicrobial activities are much more significant at *Sapindus trifoliatus* L. The seed extract of *Sapindus trifoliatus* L. species displayed inhibitory activities against the microorganisms involved in infections and skin diseases. Ethanol and Aqueous extracts of *Sapindus trifoliatus* L. Pericarp were investigated for in vitro antimicrobial screening by agar well method against *staphylococcus aureus*, *Bacillus subtilis*, *E.coli*, *Pseudomonas aeruginosa*, *Bacillus cereus*, *Aspergillus niger*, *Fusarium* spp. In the Agar well diffusion method, the highest imbibitions zone was found in aqueous extracts. It showed greater activity against the maximum tested bacteria and fungi followed by ethanol extract. The preliminary results of this study indicate that the aqueous seed extracts have the potential for antimicrobial activity.

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लोकसाहित्यातील प्रबोधन परंपरा – कीर्तन

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लोकसाहित्यात तमाशा, लावणी, जागरण गोंधळ, देवीचा गोंधळ, कलगीतुरा, अशा अनेक लोककला आहेत. लोकसाहित्यातील कीर्तन हा एक प्रयोगरूप लोककला प्रकार आहे. कीर्तन हा एक महाराष्ट्रातील सांस्कृतिक प्रकार आहे. महाराष्ट्रातील अनेक लोककलांपैकी कीर्तनालाही महत्त्वाचे स्थान लाभले आहे. पुणे जिल्ह्यात कीर्तनाला लोकप्रियता लाभली आहे. तसेच आळंदी येथे कीर्तनाचे प्रशिक्षण दिले जाते. ''लोकदैवतांच्या तिथी, यात्रोत्सवप्रसंगी, रामनवमी, कृष्णजन्मोत्सव, हनुमानजन्मोत्सव, दत्तजयंती, काल्याचा प्रसंग, काळभैरवनाथ, दसऱ्यास देवीच्या उत्सवप्रसंगी शहरी भागात अल्प परंतु खेडोपाडी कीर्तनाचे आयोजन करतात.[1] कीर्तनात अध्यात्मिक व सामाजिक विषय येतात. कीर्तनातून भगवंताचाच महिमा गायला जातो. कीर्तनातून समाजजागृती होत असल्याने गावोगावी कीर्तनाचे प्रयोग होतात.

कीर्तनकाराला लोककथेकरीबुवा, हरिदास, दासकूट अशा विविध नावाने संबोधतात. कीर्तन हा एक प्रयोग आहे. कीर्तनाच्या प्रयोगावेळेस कीर्तनकाराची शारीरिक हालचालींद्वारे सांगण्याची पद्धत महत्त्वाची असते. कीर्तन प्रामुख्याने लोकदैवतांच्या मंदिरात अथवा सभागृहात सादर करतात. कीर्तनाचा मुख्य उद्देश म्हणजे समाजाला सन्मार्गाचा उपदेश करणे होय. त्याचबरोबर कीर्तनातून परमेश्वराचे गुणगान व चरित्र कथन करतात. कीर्तनकाराने खऱ्या अर्थाने देशाची सेवा ही कीर्तनाच्या माध्यमातून केली आहे. समाजाला उपदेश करताना ईश्वर भक्तीचा महिमा वर्णन केला आहे. कीर्तनातून मनोरंजनाबरोबरच समाजजागृती लोकशिक्षण, प्रबोधनाचे महत्त्वाचे कार्य कीर्तन संस्थेने केले आहे. या संदर्भात पं. मदनमोहन मालवीय म्हणतात, हिंदू जगत् में कथा और कीर्तन धर्मोपदेशके दो प्रधान साधन है। इनके द्वाराहि हिंदु संस्कृतिकी रक्षा और प्रचार होगा।[2] हिंदू समाजामध्ये कथेला आणि कीर्तनाला विशेष महत्त्वाचे स्थान आहे. कारण या दोन्ही माध्यमाचा वापर हा प्रामुख्याने धर्माच्या प्रचार– प्रसारासाठी झालेला आहे. हिंदू संस्कृतीचे जतन, रक्षण, संवर्धन तसेच प्रचार करण्यासाठी कथा व कीर्तन या दोन्ही कला उपयुक्त आहेत.

कीर्तनकार कीर्तनातून लोकजागृती करत असतो. अशिक्षित व सामान्य जनतेला कीर्तनाच्या माध्यमातून उपदेश करत असतो. लोकजागृतीसाठी कीर्तनासारखे दुसरे साधन नाही. म्हणूनच लोकमान्य टिळक म्हणतात, मी पत्रकार झालो नसतो तर कीर्तनकार झालो असतो.[3] या टिळकांच्या विधानावरून कीर्तनाचे महत्त्व स्पष्ट होते. पत्रकार जसे समाजाला सत्य सांगण्याचे काम करतात; तशाच स्वरूपाचे काम कीर्तनकार देखील करतो. म्हणून कीर्तन परंपरा आज देखील सुरूच आहे.

कीर्तन हा एक भक्तिप्रकार असून वैदिक काळापासून प्रचलित आहे. परमेश्वर प्राप्ती मार्गासाठी कीर्तनाचे महत्त्व महाराष्ट्रातील संतांनी ओळखले. नामदेवांपासून संतांनी, आजच्या कीर्तनकारांनी कीर्तनातून कीर्तन महिमा व ईश्वर भक्तीचा प्रसार केला आहे.

नाचू कीर्तनाचे रंगी । ज्ञानदीप लावू जगी ।।

असे नामदेवांनी म्हटलेले आहे. अशा अभंगातील विचारातून समाज प्रबोधन घडून आलेले आहे.कीर्तनपरंपरेला सुरुवात नामदेवांपासून झाली आहे. खेडोपाडी लोकदैवतांच्या विविध उत्सवप्रसंगी कीर्तनाचे आयोजन करतात. कीर्तनकारांनी राष्ट्रीय भावनेच्या जागृतीसाठी तसेच लोकोपदेश केल्याने पुणे जिल्ह्यातील तथा महाराष्ट्रातील कीर्तनकारांनी भारतीय हिंदू संस्कृतीचे रक्षण केले आहे. कीर्तनकार हा देशाचा जनजागृती करणारा सेवकच आहे. म्हणून कीर्तनपरंपरेविषयी डॉ. प्र.न. जोशी म्हणतात, महाराष्ट्रातील वारकरी संप्रदायाने या कीर्तनभक्तीस जोराची चालना दिली. नामदेव महाराज हे महाराष्ट्राचे आद्य कीर्तनकार होत.

सुंभाचा करदोटा । रकट्याची लंगोटी ।।
नामा वाळवंटी । कीर्तन करी ।।

अशा प्रकारे नामदेवाचे वर्णन केले जाते.[4] कीर्तन परंपरेला खऱ्या अर्थाने लोकप्रिय करण्याचे काम वारकरी संप्रदायाने केलेले आहे. विशिष्ट वेशभूषा परिधान करून नामदेवापासून सुरू झालेली ही परंपरा आज आधुनिक काळात देखील आपले अस्तित्व टिकवून आहे. केवळ काळानुसार त्यांच्या स्वरूपामध्ये बदल झालेला आहे. हा बदल समाजाच्या प्रबोधनासाठीच महत्त्वाचा ठरत आहे.

कीर्तनाविषयी विविध व्याख्या, अर्थ आहेत. कीर्तनाला प्रासाद किंवा देवालय असे म्हटले जाते. शिलालेखात कैलास मंदिराला कीर्तन म्हटले आहे. ७ व्या शतकात धार्मिक वस्तूला कीर्तन म्हटले आहे. संस्कृतात 'कीर्त' या धातूपासून कीर्तन शब्द आलेला आहे.धार्मिक कार्याच्या निमित्ताने मंदिरासमोर लोकांसमवेत उभे राहून विविध वाद्यांच्या साथीने अभिनयाद्वारे ईश्वराचे गुणगान आध्यात्मिक प्रबोधन काव्य, नाट्य यावरोबरच पुराणातील कथा निरूपण

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करून लोकरंजन करणे म्हणजे कीर्तन होय. कीर्तन म्हणजे पुराणातील कथा सांगताना गायन करणे, स्तवन करणे, गायनाबरोबर वेगवेगळी वाद्ये वाजविणे, देवळात अथवा सभेपुढे उभे राहून परमेश्वराचे गुणवर्णन करणे.' आधुनिक कीर्तनकार काशीचे विनायक बुवा भागवतांनी कीर्तनाची केलेली व्याख्या – वीणा व इतर वाद्यांसह श्रीहरी लीलांचे वर्णन करणे हे कीर्तनाचे सामान्य स्वरूप आहे.६वर उल्लेख केलेल्या दोन अभ्यासकांच्या व्याख्यांमधून 'कीर्तन' ही संकल्पना स्पष्ट होते.

कीर्तनाच्या व्याख्या, अर्थाबरोबर, कीर्तनाची परंपरा/ इतिहास पाहिला असता नारद मुनींनी कीर्तनास प्रारंभ केला आहे. नारदमुनींकडून महर्षी व्यासांना त्याचवरोबर शिक्षण महर्षी व्यासांकडून शिक्षण प्रसार होत गेला. अशी कीर्तनाची परंपरा आहे. प्रारंभीचे कीर्तनाचे तीन प्रकार आहेत.१) गुणसंकीर्तन २) लीला संकीर्तन ३) नामसंकीर्तन. परंतु आज महाराष्ट्रातील कीर्तनाचे मुख्य दोन प्रकार आहेत १)नारदीय कीर्तन २)वारकरी कीर्तन. नवविधाभक्तीपैकी कीर्तन हा दुसरा प्रकार आहे. कीर्तनकाराचे पोशाख वर्णन असे– कीर्तनकाराच्या अंगात पांढराशुभ्र अंगरखा किंवा नेहरू सदरा, धोतर, खांद्यावर उपरणे, डोक्यावर केशरी किंवा रेशमी फेटा असतो. कीर्तनकाराच्या कपाळावर गोपीचंदन आणि बुक्क्याचा टिळा लावलेला असतो. कीर्तन प्रयोग सादर करताना विविध वाद्ये वापरतात. कीर्तनकाराबरोबर साथीदार असतो. हातात झांज, टाळ, चिपळ्या, पेटीची साथ, तबला हो वाद्ये असतात. वारकरी कीर्तनात टाळ, वीणा, पखवाज ही वाद्ये तर नारदीय कीर्तनात तंबोरा, हार्मोनियम, ऑर्गन, हातपेटी, व्हायोलिन, बासरी यांचा समावेश असतो. आर्या, दिंडी, साकी, कटाव, पोवाडा या गीत प्रकारांच्या आधारे अभिनयाच्या कौशल्याने नृत्य, नाट्य, संगीत, विनोद यामुळे कीर्तनास रंग चढतो. एकतारी, बासरीचाही वापर कीर्तनात होतो.

कीर्तनपरंपरेत विविध संतांचे महत्त्वाचे योगदान लाभले आहे. उदा. संत ज्ञानेश्वर, संत तुकाराम, संत एकनाथ, संत रामदास इ. संत गाडगेबाबांच्या कीर्तनातून सामान्य माणसांना उपदेश, मुक्या प्राणीमात्रांवर दया पालन, जातिभेद, व्यसनाधीनता अशा सामाजिक विकृतींवर हल्ला करून जनजागृती घडवून आणली. नारदीय कीर्तनपरंपरेत विविध कीर्तनकारांचे योगदान लाभले आहे. उदा. अनंत फंदी, शंकरशास्त्री भिलवडीकर, रामचंद्रबुवा काशीकर, राष्ट्रीय कीर्तनकार डॉ. दत्तात्रयबुवा पटवर्धन अलीकडच्या काळातील राईलकर, मिलिंद बडवे, गोविंद स्वामी आफळे इ. वारकरी कीर्तनाचे महत्त्वाचे व्यासपीठ आळंदी, पंढरपूर हे [illegible]. वारकरी कीर्तन परंपरेस विविध कीर्तनकारांचे योगदान लाभले आहे. उदा. ह. भ.प. विष्णुबुवा जोग, ह. भ. प. धुंडा महाराज, अलीकडच्या काळातील बाबा महाराज सातारकर, विठ्ठल बुवा चौधरी, सदानंद गुरुजी हे होत.

कीर्तनाची मुख्य ५ भागात विभागणी केली आहे. नमन पूर्वरंग, मध्यंतर नामजप आणि भक्तिगीत पूर्वरंगाला साजेशी कथानक उत्तररंग किंवा आख्यान, शेवटी भैरवी गायन, देवाकडे मागणे व आरती ही कीर्तनाची प्रमुख दोन अंगे आहेत. १) पूर्वरंग २) उत्तररंग. पूर्वरंगात परमार्थिक विषय सादर करतात. तर उत्तररंगात त्याचाच एक भाग म्हणून रामायण, महाभारत पुराणाचे आख्यान वर्णन येते.

कीर्तनकार प्रथम गणपती व इतर देवतांचे नमन करून मंगलाचरण, ध्रुवपद, भजन, अभंग पूर्वरंगात करतात. त्यानंतर भजन म्हटले जाते. आख्यानात साकी, दिंडी, कटाव व पदे रागदारीत गाऊन कथेकरी आख्यान करतो. कीर्तनकाराजवळ न्याय, वेदान्त याबरोबरच संस्कृत भाषा, तालासुराचे ज्ञान आवश्यक आहे. इतिहास, पुराणे, मराठी, हिंदी काव्य यांचेही ज्ञान असणे गरजेचे आहे. वारकरी कीर्तनात मध्यभागी कीर्तनकार असतो. बाजूस टाळकरी असतात. हे कीर्तन संतांच्या वाडमयाच्या आधारे होत असते. कीर्तनात शब्दांची अचूक फेक, खटकेबाजपणा महत्त्वाचा असतो. कीर्तनात अभिनय, मुद्राभिनय, शारीरिक हालचाली, संवादासाठी बोलीभाषेचा वापर, विनोदनिर्मिती, ग्रामीण बोलीभाषेचा वापर महत्त्वाचा असतो. आज प्रमाण भाषेचाही वापर होत असतो. नारदीय कीर्तनासाठी प्रमाण मराठी भाषेचा वापर होतो. साधारणपणे कीर्तनात अध्यात्मिक विषयच येतात.

कीर्तनात जय जय रामकृष्ण हरी व विठ्ठल विठ्ठल असा भगवंताचा नामघोष करतात. कीर्तनात प्रामुख्याने गायन, वादन, वक्तृत्व, विनोद, अभिनय, गांभीर्य आणि श्रोता प्रेक्षकांच्या संबंधीची हृदयस्पर्शी आपुलकी ही वैशिष्ट्ये आढळतात. कीर्तनकाराचे महत्त्वाचे विशेष बहुश्रुतता आणि उपस्थिती हे होत. पूर्वी कीर्तन मनोरंजन व आनंद म्हणून करायचे. सध्या कीर्तन एक व्यवसाय असून कीर्तनाची पुणे, आळंदी येथे महाविद्यालये आहेत. धैर्य, सूर, ताल, लय, गाणे, वक्तृत्व, शास्त्र, पुराण ही कीर्तनाची आठ अंगे आहेत. कीर्तन हे विधीनाट्य नसले; तरी बऱ्याच अंशी सारखेपणा आहे. दोन्हीत प्रयोगनिष्ठ पारंपरिक कलात्म आविष्कार आहेत.

पु[illegible]ल्ह्यातील सांस्कृतिकतेत व लोकदैवतांना महत्त्व प्राप्त झाले ते कीर्तनकारांमुळेच. पुणे जिल्ह्यात कीर्तनकारांची संख्याही विपुल प्रमाणात आहे.

लोकप्रबोधन:

कीर्तनातून अध्यात्मिक, सामाजिक विषय येतात. कीर्तनातून भगवंताचाच महिमा गायला जातो. कीर्तनकार सामान्य जनतेला समजेल अशा स्वरूपात कथन करतो. त्यातून समाजास नितीबोध व सदाचरणाचा पाठ दिला जावा असा उद्देश असतो. कीर्तनातून ईश्वर भक्ती, समाज परमार्थाच्या मार्गाला लावणे, चांगल्या विचारांसाठी समाज एकत्र येतो. कीर्तनातून निर्भेळ सुख मिळविण्याचे साधन परमार्थ, सुख, समाधान, आनंद हे साध्य होते. कीर्तनातून धर्माचा प्रचार, प्रसार, मनोरंजनाबरोबर, लोकशिक्षण, समाजजागृती घडून येते. नामदेवापासून आजच्या संतांनी कीर्तनातून कीर्तन महिमा व ईश्वर भक्तीचा प्रसार केला आहे. कीर्तनकारांनी हिंदू संस्कृतीचे रक्षण केले आहे. कीर्तनातून संस्कार सांगितले जातात. कीर्तनातून संस्कृतीची जपणूक झालेली आहे. कीर्तनाचा मुख्य उद्देश म्हणजे समाजाला सन्मार्गाचा उपदेश करणे होय. त्याचप्रमाणे आजच्या कीर्तनातून शिक्षणाविषयी जनजागृती कीर्तनकार करतात. आजचा समाज आई-वडिलांना विसरतो. आई-वडिलांना सांभाळा म्हणून तरुणांचे डोळे उघडावे अशी जनजागृती करतात. मुला मुलींचे विवाह धकाधकीच्या जीवनात उशिरा

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होतात ही समस्या आहे. याचर कीर्तनकार जनजागृती करतात. रोजगार, नोकरी, उद्योगधंदे, समाजात वाढते अत्याचार, अन्याय, सावकारकीच कर्ज, हुंडाबळी, आत्महत्या करणारा शेतकरी, व्यसनाधीन बेरोजगार तरुण, स्वच्छता, पाणीप्रश्न, झाडे लावा, देश जगवा, प्रदूषण हटवा, संस्कार जपा, संस्कृती जपा असे कीर्तनकार कीर्तनातून सांगतात. म्हणजेच समाज जागृतीचे संदेश की र्तन या लोककलेमधून येतात.

निष्कर्ष:

१) कीर्तनाच्या माध्यमातून हिंदू संस्कृतीचे जतन, रक्षण आणि प्रचार झालेला आहे. पुणे जिल्ह्याच्या सांस्कृतिकतेत लोकदैवतांना महत्त्व प्राप्त होण्यास, लोककला जिवंत ठेवण्यास कीर्तनकारांची महत्त्वाची भूमिका आहे.

२) कीर्तनामुळे समाजजागृती / लोकप्रबोधन घडून येते.

समारोप:

कीर्तन या लोककलाप्रकारात कीर्तन म्हणजे काय ? विविध व्याख्या, अर्थ स्पष्ट केले आहेत. कीर्तनाची प्राचीन परंपरा, संतांचे योगदान, कीर्तनाचे प्रकार, वाद्ये यांची मांडणी केली आहे. पूर्वरंगात व उत्तररंगात कीर्तनाची मांडणी केलेली आहे. कीर्तनाची महत्त्वाची वैशिष्ट्ये नोंदविली आहेत. कीर्तनातून मनोरंजन, लोकशिक्षण, समाज प्रबोधन केले जाते. या सर्व बाबींचे विवेचन या शोधलेखात केले आहे. कीर्तनात ग्रामीण बोली भाषेच्या वापराबरोबर प्रमाण मराठी भाषेचा वापर झालेला आहे.

संदर्भ:

१) ज्ञानेश्वर माऊली खराडे (कीर्तनकार, पुणे) यांची घेतलेली मुलाखत.

२) पाठक यशवंत, नाचू कीर्तनाचे रंगी, कॉन्टिनेन्टल प्रकाशन, पुणे, पहिली आवृत्ती १९८०, पृ.०१.

३) देखणे रामचंद्र, महाराष्ट्राची सांस्कृतिक लोककला, पद्मगंधा प्रकाशन, पुणे, आवृत्ती नोंद उपलब्ध नाही, पृ.५९.

४) जोशी पं. महादेवशास्त्री (संपा.), भारतीय संस्कृतिकोश, दुसरा खंड, भारतीय संस्कृतिकोश मंडळ, पुणे, पहिली आवृत्ती १९६४, पृ.३५१.

५) राणे सदानंद, लोकगंगा, महाराष्ट्राच्या लोककला आणि लोकनृत्ये, डिंपल पब्लिकेशन्स, ठाणे, पहिली आवृत्ती २३ मार्च २०१२, पृ. ९९.

६) जोशी पी. जी., कीर्तनरंग (कीर्तन परंपरेचा इतिहास), मीरा बुक्स अँड पब्लिकेशन, औरंगाबाद, पहिली आवृत्ती २२ जानेवारी २०१०, पृ.१६-१७

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बुधवार, दिनांक : २६ मार्च २०२५

प्रमाणपत्र

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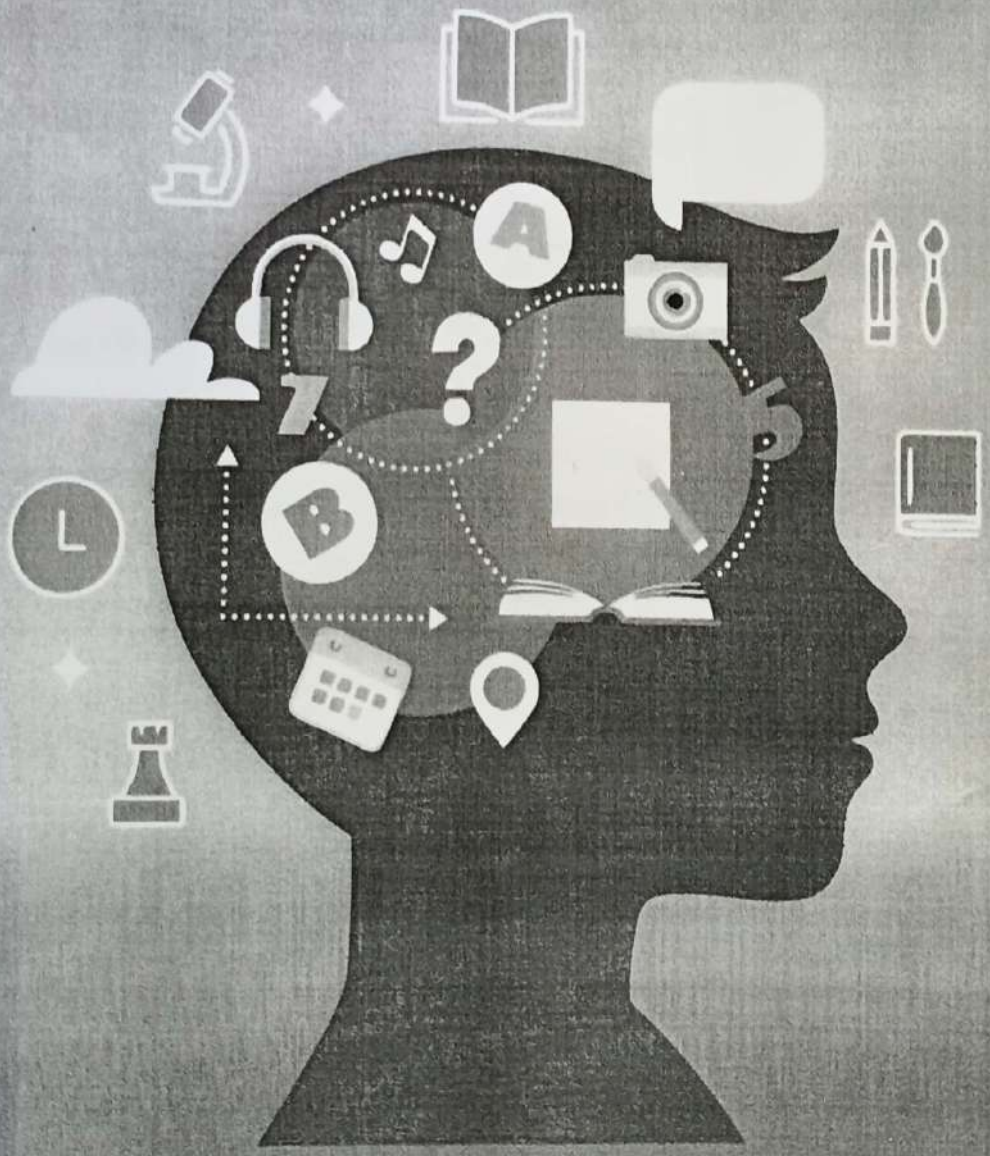
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६. 'आइने अकबरी' में संगीत वाद्यों का वर्णन करते हुए यंत्र।

७. श्री एस०एस० टैगोर के विचार

८. भारतीय वांघाचा इतिहास श्री म०ह० तारल कर पृ० ७५–७६.

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चित्र सूची

1- Akbar at court receives the child Akbar Rahim. Akbar Name, 1.5.2/1896, ACC No. 7/117 Geetisen Paintings from the Akbar Nama Plate 15 Picture No. 1

2- This Picture - Bullocks drag the connouns up hill during the siege of Ranthambar: Akbar Nama 1.5.2/1896, ACC No. 72/117 Inscribed tarah Miskina amal Paras - Akbar Nama (Geeti Sen) Picture No.2

3- This Picture - was elephants callide in battle - Akbar Nama 1.5.2/1896 MACC. No. 115/117, Geeti Sen Paintings from the Akbar Nama Plate - 19. Picture No. 3

४. यह चित्र दारा शिकोह के विवाह का है पाद शाह नामा चित्र सं०–४

3- lovers on a Terrace Attributed to Balchand from the Leningrad Album Mugal CA 1633 C Mughal and Rajput Painting This Picture No. 5

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डॉ. सुरेश शुक्ल चन्द्र
आकाश झुक गया नाटक का अध्ययन

प्रा. मनिषा रामचंद्र गाडीलकर
हिंदी विभाग प्रमुख,
श्री मुलीकादेवी महाविद्यालय, निघोज, तह.पारनेर,
जिला .अहमदनगर

प्रस्तावना :

डॉ.सुरेश शुक्ल 'चन्द्र' प्रख्यात नाटककार है। हिन्दी समकालीन हिन्दी नाटक लेखन में इनका नाम जाना–पहचाना है। बृहत्तर मानव–मूल्यों की स्थापना एवं विश्व–कल्याण की भावना को लेकर चलने के कारण डॉ.चन्द्र समकालीन नाटय परिदृश्य में अपनी अमिट छाप छोडने में समर्थ है। प्रयोगशीलता के दौर से गुजरता हुआ वर्तमान परिवेश वस्तु और शिल्प दोनो ही क्षेत्रों में अनेक प्रयोगों को सृजित कर रहा है। जीवन और साहित्य के अटूट संबंध की श्रृंखला मनुष्य के जीवन में अनेक रास्तों से होते हुए किसी पड़ाव पर पहुँचती है। जीवन और साहित्य का अभिन्न संबंध रहा है। कोई भी साहित्यकार कितना ही तटस्थ क्यों न हो, फिर भी साहित्य में उसके जीवन के कुछ–ना–कुछ अंश हमें दिखाई ही देते हैं/..' डॉ. शुक्ल जी के आकाश झुक गया नाटक का अध्ययन करने का निम्न रुप प्रयास किया है –

कथ्य :

डॉ.सुरेश शुक्ल चंद्र जी का घस्क्तक्त ई में प्रकाशित 'आकाश झुक गया' यह नाटक पहले एकांकी के रूप में लिखा गया,और बाद में यह नाटक पूर्णाकार नाटक के रूप में परिवर्तित हुआ। आज के भौतिकवादी युग में 'मैं' वृत्ति ने मानवीयता की 'हम' वृत्ति को पराजित कर दिया है। इस नाटक में संसार में मैं और हम का संघर्ष चलता रहता है किन्तु आज भौतिकता

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व व्यावसायिकता के जिस युग में हम जी रहे है, समें चतुर्दिक में प्रवृत्ति ही परिव्याप्त है, यह बताने का प्रयास किया है।१

आकाश झुक गया चन्द्र जी का प्रयोगशील, मानवीय मूल्यों की गिरावट को चित्रित करनेवाला नाटक है, इसमें कथ्य को सहज रूपायित करने के लिए स्वामी युगानंद' को समकालीन युग के 'मैं' का प्रतीक माना गया है। वह युवक–युवतियों को समझाता है कि –

शादी की मान्यता अब व्यर्थ हो चुकी है। शादी तो आधुनिक जीवन की एक बाधा है। इससे व्यक्ती की स्वतंत्रता नष्ट हो जाती है और फिर वह खुलकर जीवन को इनज्वाय नही कर सकता।... जीवन इनज्वाय के लिए है .... अब मैं का युग है।

डॉ. सुरेश शुक्ल चन्द्र के नाटक में अंकित पुरुष पात्र:–

सबसे पहले पुरुष शब्द का अर्थ 'नर' से प्रयुक्त होता रहा है। लेकिन बाद में समाज में विविध सामाजिक संस्थाएँ निर्माण होती गयी और पुरुष शब्द के अर्थ में भी परिवर्तन हुआ। समाज में विवाह संस्था का निर्माण प्रथा के विकास के बाद मालिक के अर्थ में प्रयुक्त हुआ। धर्म और अध्यात्म के विकास के बाद आत्मा, परमात्मा, और ईश्वर माना गया। ऋग्वेद के पुरुष सुक्त में उसे केवल पुरुष कहा है। ईश्वर पुरुषोत्तम अथवा प्रथम पुरुष है। ऐसी कल्पना दुनिया के सभी प्रसिध्द धर्मो के आधार रुप में स्वीकार की है।२ वैदिक वाड़मय में 'पुरुष' शब्द परमेश्वर के अर्थ में प्रयुक्त हुआ है। कुल मिलाकर कहा जाए तो समाज में पुरुष का स्वरूप अत्यंत वैविध्यपूर्ण है। वह अलग–अलग क्षेत्रों में अपनी अलग–अलग भमिकाएँ निभाता रहा है। समाज में कभी वह खलनायक है तो कभी मर्यादा पुरुषोत्तम भी है। परिवार में अपने अंतिम समय तक संघर्ष करता है। वह शोपक भी है और शोषित भी है। वह किसी का पुत्र, किसी का पति, किसी का भाई, किसी का पिता समाज में वह अलग–अलग प्रकार की भुमिकाओं को निभा रहा है। पुरुप पात्रों तथा उनके चरित्र–चित्रण पर प्रकाश डालेंगे –

डॉ. सुरेश शुक्ल चन्द्र जीके आकाश झुक गया नाटक में कुल मिलाकर आठ से अधिक पुरुष पात्र है। लेकिन इनमें स्वामी युगानंद और शिष्य रोजीलाल उर्फ योगीलाल यह दो प्रमुख पात्र है और शेष पात्र निलकांठ, विवेकरंजन, रोजीलाल, कृष्णनाथ, सेवकराम, भगिपाल, नरणदास, और वृद्ध ब्राम्हण. छात्र शिक्षक, जीविका–खेती, व्यापारी, नेता, लेखक कलर्क एक संक्षिप्त एवं निश्चित भूमिका में दिखाई देते है।

स्वामी युगानंद इस नाटक का केंद्रिय पात्र है। वह 'संसार मठ' का मठाधीश है। उसका प्रभाव हर क्षेत्र में फैला हुआ है। छात्र, अध्यापक नेता, लेखक, व्यापारी, साधु–संन्यासी बेकार युवक–युवतियाँ आदि सभी उसके शिष्य है। वह उन्हें मैं का मंत्र देकर बेईमानी, कालाबाजारी, धोखा, फरेब, आदि अराजक आचरण करने की प्रेरणा देता है। और स्वयं शिष्याओं के साथ मठ में वासनापूर्ति का खेल खेलता रहता है। उसके आचरण से सारी व्यवस्था दुर्गन्ध देने लगती है, लेकिन समाज की नस–नस में वह ऐसी जमा हो चूकी है, मानों वह अजेय है।

युगानंद एक प्रतिक चरित्र है, उसकी चरित्र–प्रतिकात्मकता महत्त्वपूर्ण है। वह भौतिकवादी वृत्ति का प्रतिक है, और वह मैं का उपासक है। हर युग में आनंद भोग की वृत्ति ही प्रमुखता है। 'हम' से उसको नफरत है, वह 'मैं' का एक छात्र है और मानवीय–मूल्यों के 'हम' को निर्मुल करने के लिए प्रयासरत है। वह कहता है, वासना और प्रेम एक सिक्के के दो पहलु है बिना वासना के प्रेम की सार्थकता क्या है? यह ही मेरी शक्ति है।३ स्वामी युगानंद की आनंद भोग की वृत्ती धीरे–धीरे वासना में ही सीमित हुई थी। उसके लिए व्यक्ति की वास्तविक में ही सीमित नैतीक पक्ष का उसके लिए कोई महत्त्व नहीं है। वर्तमान पर अतीत को लादकर नैतिकता और धर्म की बातें करनेवाले सामाजिक आदर्श के ठेकेदारों से वह घृणा करता है। उसके शिष्य भी संसार से उन्मुक्त विचरण करते हुए दिखाई देते है। उसके हित के जितने भी कार्य है वह उसे करने ही है।

'आकाश झुक गया' नाटक का दुसरा महत्त्वपूर्ण पात्र है रोजीलाल जो पढ–लिखकर बेकार भटकते हुए, युगानंद के मठ में पहुँच जाता है। स्वामी युगानंद

से दीक्षा लेने के बाद वह भोगीलाल नाम से जानने लगा है। वह मेहनत और मजदूरी करके,पढानेवाले माँ–बाप का एकलौता पुत्र है। वह एक गर्मस्पर्शी व्यक्ति है। इसलिए वह रोजीलाल से भोगीलाल बन जाता है। लेकिन वह युगानंद के संस्कारों में ढलने की वजह से 'खाओ पिओ और मौज करो' के संस्कार का अनुकरण करने लगता है। जब उसके पिताजी उसे खोजते हुए मठ में चले आतें है, तब वह अपने पिताजी को स्विकारने के बजाय पहचानने से इन्कार करता है। किन्तु स्वामी का यह दबाब उसके अंतर्मन को व्यथित कर देता है।रोजीलाल पर युगानंद की गहरी छाप दिखाई देती है। वह भोगवादी वृत्ति के आचरण को पूर्ण रुप से स्वीकार कर चुका है। रोजीलाल का चरित्र आज की वर्तमान स्थिति को चित्रित करता है। मठ में उसकी वर्तमान स्थिति सामाजिक दशकों को गहरी चोट देती है।

डॉ. सुरेश शुक्ल चन्द्र के नाटक में अंकित नारी पात्र

मनुष्य निर्मित संसार की सम्पूर्ण उपलाब्धियाँ नारी और पुरुष के समान योगदान को प्रतिपादित करती है। जीवन की सुंदरतम् सृष्टि नारी है। हिंदी बडी नाटकीय परम्परा में नारी पात्रों का अभाव देखा जाता है। हमारे समाज में प्राचीन काल से ही भारतीय संस्कृति में नारी का महत्त्वपूर्ण स्थान रहा है। प्राचीन काल में नारी की अवहेलना भले ही क्यों न हुई हो, फिर भी उसके महत्त्व को नकारा नहीं जा सकता क्योंकि नारी ज की नींव है। डॉ. घनश्याम भुतडा नारी के महत्त्व को चित्रित करते हुए कहते है,"भारतीय संस्कृति में नारी का स्थान महत्त्वपूर्ण है। संसार में यदि नारी न होती, तो सभ्यता और संस्कृति ही न होती। अपने विविध रुपों में नारी ने पुरुषों को संवर्धन, प्रोत्साहन और शक्ति दी है। वह समाज में पुरुषों के लिए कभी जन्मदात्री पोषणकर्ती माता के रुप में आती है। तो कभी स्नेह की भावधारा में प्रवाहित करनेवाली भगिनी के रुप में लक्षित होती है। अत: समाज में माता, त्नी, भगिनी, पुत्री, सखी, सपत्नी, सेविका, परिचारिका पत्निनी आदि अनेक रुप है। धार्मिक दृष्टि से वह ा जगदम्बा, लक्ष्मी, सरस्वती, श्री आदि रुपों में श्रद्धा एवं पूज्यभाव में दिखाई देती है। राजनीतिक दृष्टि से नारी, योद्धा, कुटनीतिज्ञ शासिका तथा दासी आदि रुपों में दिखाई देती है। काव्यशास्त्रीय दृष्टि से स्वकीया, परकीया, वासक, सज्जा, प्रेषित–पतिका आदि अनेक रुपों में दिखाई देती है।४

शुक्ल जी के आकाश झुक गया नाट्क के नारी पात्रों तथा उनके चरित्र–चित्रण पर प्रकाश डालेंगे– डॉ. सुरेश शुक्ल चन्द्र के 'आकाश झुक गया' नाटक में दो प्रमुख नारी पात्र 'वासनाकुमारी' और 'प्रेमकुमारी' है। जो क्रमश: वासना और प्रेम के प्रतीक है। वासनाकुमारी आधुनिक अवसरवादी ऐश्वर्यभोगी पथ–भ्रष्ट युवतियों के चरित्र को चरितार्थ करती है। और स्वामी युगानंद के साथ पूरे समाज का पथभ्रष्ट बनाने की सक्रिय भूमिका अदा करती है। वर्तमान युग के इस ऐहिक आनन्द की सशक्त धुरी वासनाकुमारी है। वह अपने सुख के लिए युगानन्द से जुडती है। लेकिन एकरस जिन्दगी उसे पसन्द नहीं है। वह भोगीलाल से कहती है, मैं तो लाईफ में चेंज चाहती हूँ। इकहरी लाईफ मुझे पसन्द नहीं है।५

वह एकरस जिन्दगी से ऊबकर भोगीलाल के साथ भाग जाती है।

'आकाश झुक गया' इस नाटक का दूसरा नारी चरित्र प्रेमकुमारी का है। वह पहले संतुलित जीवन की पक्षधर है लेकिन जब प्रेम में धोखा खा जाती है, तब स्वामी युगानन्द से जुडकर भौतिकता की ओर आकृष्ट हो जाती है। एक बार पुन: विदयाभूषण के साथ जीवन निर्वाह करने लगती है। लेकिन स्वामी युगानन्द के मठ में लौट आने केबाद मैं का मंत्र अपनाकर वासनाकुमारी का स्थान लेती है। इस नाटक के दोनों नारी चरित्र वर्तमान समाज के भौतिकवादी मनोवृत्ति के पोषक है।

संवाद :

आकाश झुक गया यज एक प्रयोगशील नाटक होनाव को कारण इसके संवाद भी रोचक और प्रेरणात्मक है। संवाद छोटे और नाटकीय अनुभूति से युक्त है ।

भाषा :

नाटक की भाषा हम सबकी जानी–पहचानी यांनी आम बोल–चाल की भाषा है । खेल तमाशों में

से दीक्षा लेने के बाद वह भोगीलाल नाम से जानने लगा है। वह मेहनत और मजदूरी करके,पढानेवाले माँ–बाप का एकलौता पुत्र है। वह एक मर्मस्पर्शी व्यक्ति है। इसलिए वह रोजीलाल से भोगीलाल बन जाता है। लेकिन वह युगानंद के संस्कारों में ढलने की वजह से 'खाओ पिओ और मौज करो' के संस्कार का अनुकरण करने लगता है। जब उसके पिताजी उसे खोजते हुए मठ में चले आतें है, तब वह अपने पिताजी को स्विकारने के बजाय पहचानने से इन्कार करता है। किन्तु स्वामी का यह दबाब उसके अंतर्मन को व्यथित कर देता है।रोजीलाल पर युगानंद की गहरी छाप दिखाई देती है। वह भोगवादी वृत्ति के आचरण को पूर्ण रुप से स्वीकार कर चुका है। रोजीलाल का चरित्र आज की वर्तमान स्थिति को चित्रित करता है। मठ में उसकी वर्तमान स्थिति सामाजिक दशकों को गहरी चोट देती है।

डॉ. सुरेश शुक्ल चन्द्र के नाटक में अंकित नारी पात्र

मनुष्य निर्मित संसार की सम्पूर्ण उपलब्धियाँ नारी और पुरुष के समान योगदान को प्रतिपादित करती है। जीवन की सुंदरतम् सृष्टि नारी है। हिंदी बडी नाटकीय परम्परा में नारी पात्रों का अभाव देखा जाता है। हमारे समाज में प्राचीन काल से ही भारतीय संस्कृति में नारी का महत्त्वपूर्ण स्थान रहा है। प्राचीन काल में नारी की अवहेलना भले ही क्यों न हुई हो, फिर भी उसके महत्त्व को नकारा नहीं जा सकता क्योंकि नारी समाज की नींव है। डॉ. घनश्याम भुतडा नारी के महत्त्व को चित्रित करते हुए कहते है,"भारतीय संस्कृति में नारी का स्थान महत्त्वपूर्ण है। संसार में यदि नारी न होती, तो सभ्यता और संस्कृति ही न होती। अपने विविध रुपों में नारी ने पुरुषों को संवर्धन, प्रोत्साहन और शक्ति दी है। वह समाज में पुरुषों के लिए कभी जन्मदात्री पोषणकर्ती माता के रुप में आती है। तो कभी स्नेह की भावधारा में प्रवाहित करनेवाली भगिनी के रुप में लक्षित होती है। अत: समाज में माता, पत्नी, भगिनी, पुत्री, सखी, सपत्नी, सेविका, परिचारिका तपस्विनी आदि अनेक रुप है। धार्मिक दृष्टि से वह रमा जगदम्बा, लक्ष्मी, सरस्वती, श्री आदि रुपों में श्रद्धा एवं पूज्यभाव में दिखाई देती है। राजनीतिक दृष्टि से नारी, योद्धा, कुटनीतिज्ञ शासिका तथा दासी आदि रुपों में दिखाई देती है। काव्यशास्त्रीय दृष्टि से स्वकीया, परकीया, वासक, सज्जा, प्रेषित–पतिका आदि अनेक रुपों में दिखाई देती है।[४]

शुक्ल जी के आकाश झुक गया नाटक के नारी पात्रों तथा उनके चरित्र–चित्रण पर प्रकाश डालेंगे– डॉ. सुरेश शुक्ल चन्द्र के 'आकाश झुक गया' नाटक में दो प्रमुख नारी पात्र 'वासनाकुमारी' और 'प्रेमकुमारी' है। जो क्रमश: वासना और प्रेम के प्रतीक है। वासनाकुमारी आधुनिक अवसरवादी ऐश्वर्यभोगी पथ–भ्रष्ट युवतियों के चरित्र को चरितार्थ करती है। और स्वामी युगानंद के साथ पूरे समाज का पथभ्रष्ट बनाने की सक्रिय भूमिका अदा करती है। वर्तमान युग के इस ऐहिक आनन्द की सशक्त धुरी वासनाकुमारी है। वह अपने सुख के लिए युगानन्द से जुडती है। लेकिन एकरस जिन्दगी उसे पसन्द नहीं है। वह भोगीलाल से कहती है, मैं तो लाईफ में चेंज चाहती हूँ। इकहरी लाईफ मुझे पसन्द नहीं है।[५]

वह एकरस जिन्दगी से ऊबकर भोगीलाल के साथ भाग जाती है।

'आकाश झुक गया' इस नाटक का दूसरा नारी चरित्र प्रेमकुमारी का है। वह पहले संतुलित जीवन की पक्षधर है लेकिन जब प्रेम में धोखा खा जाती है, तब स्वामी युगानन्द से जुडकर भौतिकता की ओर आकृष्ट हो जाती है। एक बार पुन: विदयाभूषण के साथ जीवन निर्वाह करने लगती है। लेकिन स्वामी युगानन्द के मठ में लौट आने केबाद मैं का मंत्र अपनाकर वासनाकुमारी का स्थान लेती है। इस नाटक के दोनों नारी चरित्र वर्तमान समाज के भौतिकवादी मनोवृत्ति के पोषक है।

संवाद :

आकाश झुक गया यज एक प्रयोगशील नाटक होनाव को कारण इसके संवाद भी रोचक और प्रेरणात्मक हैं। संवाद छोटे और नाटकीय अनुभूति से युक्त है ।

भाषा :

नाटक की भाषा हम सबकी जानी–पहचानी यानी आम बोल–चाल की भाषा है । खेल तमाशों में

प्रयुक्त की जानेवाली भाषा में व्यंग्य का भरपूर उपयोग करके रोचकता का समावेश किया गया है ।

संदर्भ सूची :

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****

शोध सारांश :– एक सुपरिभाषित, सुनियोजित और प्रगतिशील शिक्षा नीति हर देश के लिए जरूरी है क्योंकि शिक्षा आर्थिक और सामाजिक प्रगति की आधारशिला है। उनके संबंधित को ध्यान में रखते हुए परंपराएं और संस्कृति, विभिन्न देश विभिन्न शिक्षा प्रणालियों को अपनाते है। राष्ट्रीय शिक्षा नीति को २८ जुलाई, २०२० को भारत के केंद्रीय मंत्रिमंडल द्वारा अनुमोदित किया गया था। ३४ साल के अंतराल के बाद,भारत सरकार ने ५० महीने से अधिक समय तक चले परामर्श और कार्यशालाओं के दौरान २.५ लाख ग्राम–स्तरीय हितधारकों से प्रतिक्रिया को दो राष्ट्रीय संसदीय स्तर की समितियों तक समेकित किया है। हालांकि, नीति ने किस हद तक सिफारिशों को शामिल किया है, यह अज्ञात है। यह लेख शिक्षाशास्त्रियों की दृष्टि से नीति का विश्लेषण करने का प्रयास करता है। विशेष रूप से, हम पिछले पांच वर्षों के अपने अनुभव से स्कूल शिक्षा खंड के नौ प्रमुख अध्यायों की जांच करते हैं, जिसमें नीति जीवन–चक्र को महाराष्ट्र में कार्यान्वयन और मूल्यांकन को सूत्रीकरण के माध्यम से देखा गया है, प्रधानमन्त्री नरेन्द्र मोदी ने कहा कि वर्ष २०२२ में जब भारत स्वतंत्रता के ७५ वर्ष पूरे होने का पर्व मना रहा होगा, तब सभी भारतीय विद्यार्थियों को

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साहित्य और समाज का संबंध बहुत गहरा है। यह समाज का वह परिधान है जो जनता के जीवन के सुख-दुख, हर्ष-विषाद, आकर्षण-विकर्षण के ताने बाने से बुना जाता है। उसमें विशाल मानव-जाती की आत्मा का स्पन्दन ध्वनित होता है। वह जीवन की व्याख्या करता है। इसी से जीवन देने की शक्ति आती है। वह मानव को, उसके जीवन को लेकर ही जीवित है इसीलिए वह पूर्णता: मानव केंद्रित है। साहित्य उसी मानव की अनुभूतियों, भावनाओं और कलाओं का साकार रूप है। मानव सामाजिक प्राणी है। सामाजिक समस्याओं, विचारों से प्रभावित होता है इसी प्रभाव का मुखर रूप साहित्य है। साहित्य को समाज का दर्पण कहा जाता है। साहित्य समाज रूपी शरीर की आत्मा है। साहित्य अमर है। साहित्य और समाज का संबंध अभिन्न है। समाज के बिना साहित्य निर्माण असंभव है। ठिक उसी प्रकार साहित्य के बिना समाज भी कोई महत्व नहीं रखता। साहित्य एक बहुत बडा सशक्त माध्यम है। फिल्म भी बहुत प्रभावशाली व सशक्त माध्यम है। दोनों ही कला के अलग-अलग स्वरूप है। फिल्म दृष्य-श्रव्य माध्यम है तो साहित्य शब्दो पर आश्रित है। साहित्यकार को केवल कागज और पेन की जरुरत होती है और फिल्म निर्देशक को कला पक्ष के साथ-साथ उसका तकनीकी पक्ष भी देखना पड़ता है। फिल्म निर्माण की बड़ी प्रक्रिया से उसे गुजरना पड़ता है। जो भी हो साहित्य और सिनेमा कला और मनोरंजन जगत के दोन महत्वपुर्ण माध्यम है। साहित्यकार और निर्देशक समाज में ही जन्म लेते और समाज में ही पलते हैं और समाज के आसपास की परिस्थितीओं से प्रभावीत होकार व्यथित होकार अपना-अपना सर्जन करते हैं। साहित्यकार और दिग्दर्शक दोनों का धर्म है, सामाजिक हितों की रक्षा करना साहित्य और सिनेमा में जिवन उपयोगी उपदेश देने की शक्ति होती है। सिनेमा की तुलना में साहित्य का इतिहास पुराना है। एक आधुनिक कला सिनेमा और एक अत्यंत पुरानी साहित्य परंपरा के बीच अत्यंत गहरा संबंध है।

साहित्य की परिभाषाएँ

साहित्य कला की प्रशंसा करते हुए भरत ने लिखा है कि, "जिसकी रचना कोमल और ललित पदों में की गई हो, शब्द एवं अर्थ गूढ़ न हो, जन -सामान्य जिसे सरलता से हृदयंगम कर सके और जो तर्क संगत हो - वही साहित्य है।"[1] इससे यह स्पष्ट हो जाता है कि जन -सामान्य के साथ साहित्य का सीधा संबंध रहा है।

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आचार्य कुंतक ने किंचित विस्तार से परिभाषा करते हुए लिखा - "शब्द और अर्थ का मनोहर विन्यास साहित्य है, जिसमें शब्द और अर्थ परस्पर इतने संतुलित हो कि न तो कोई न्यून हो और न कोई अधिक हो।"[2] इससे यह स्पष्ट हो जाता है कि शब्द और अर्थ का गहरा संबंध है।

सिनेमा की परिभाषाएँ

सत्यजित रे ने सिनेमा की परिभाषा इस प्रकार दी है- "फिल्म छवि है, फिल्म शब्द है, फिल्म गति है, फिल्म नाटक है, फिल्म कहानी है, फिल्म संगीत है, फिल्म में मुश्किल से एक निमट का टुकड़ा भी इन बातों का साक्ष्य दिखा सकता है।"[3] सिनेमा में सभी चीजें एक साथ प्रस्तुत कर सकते हैं।

पटकथाकार मनोहर श्याम जोशी ने लिखा है, "सिनेमा दृश्य-श्रव्य माध्यम है, जिसका मूलमंत्र है 'बताओ मत दिखाओ उधर नाटक का मूलमंत्र है 'बताओ मत दिखाओ'।"[4] सिनेमा कुछ भी नहीं होकर वह एक अन्वेषणकारी माध्यम है। जिसे शब्दों में नहीं कहा जा सकता।

साहित्य और सिनेमा यह दोन अलग-अलग कला है। इन दो कला को मिलाकर एक नई कला निर्माण होती है और वह बहुत प्रभावी समाज परिवर्तन का माध्यम बन जाती है।

प्रो. पुरुषोत्तम कुंदे- "साहित्य और सिनेमा दोनों भी कलाओं का एक-दूसरे से परस्पर संबंध है। और यह दोनों विधाएँ साथ मिलकर समाज सुधार की भूमिका निभाती है तो निश्चित ही देश का सामाजिक स्तर विकसित होगा। ऐसी स्थिति में आवश्यकता इस बात की है कि सरकारी एवं सामाजिक दोनों स्तरों पर ऐसी कोशिश की जानी चाहिए की सिनेमा आधुनिक तकनीक वाली साहित्य विधा के रूप में प्रतिष्ठित हो सके और समाज निर्माण में उसकी भी अहम भूमिका बने। क्योंकि सिनेमा माध्यम का करोड़ों लोगों के जीवन पर असर पड़ता है।"[5] लोग अपने जीवन के बहुत से तौर तरीके सिनेमा से सीखते हैं। 21 वी सदी के इस दौर में आज समस्त विश्व पर सबसे जादा प्रभाव जिस माध्यम का वह सिनेमा ही है। हमारे रिति-रिवाज, खान-पान, रहन-सहन से लेकर चिंतन तक सिनेमा की पहुंच विलक्षण प्रतिमान लेकर उपस्थित हुई है। समुची मानव सभ्यता का यथार्थ जिस माध्यम से हमारे सामने उपस्थित है, उसमें सिनेमा की भूमिका अग्रणी है। यह सिनेमा ही है जिसने विश्व संस्कृती की अवधारणा को नये आयाम दिये हैं। जनसंचार के सशक्त माध्यम के रूप में या कहे की मानवीय संवाद बनाये रखने के लिए सिनेमा आज के समय की सबसे बड़ी जरूरत है। सिनेमा को आज कला के रूप में स्वीकृती मिल चुकी है। जिस प्रकार अन्य विधाये सिनेमा से प्रभावीत हुई है उसी प्रकार हिंदी साहितिक कृतियोंपर भी सिनेमा का विस्तृत प्रभाव देखा जा सकता है। हिंदी साहितिक कृतियोंपर निर्मित होनेवाली फिल्मो में बहुत सी संभावनाएँ नजर आती है और महसूस होता है की, यदी सिनेमा और साहित्य के संबंध को सही ढंग से परखा तो विस्तृत जनसमुदाय को विभन्न रचनाकारों की कालजयी कृतियों से परिचित कराया जा सकता है। नाटक सिनेमा का विकसित रूप है। अथवा वह एक ऐसा नाटक है जो जीवन के रंगमंचपर खेला जाता है। जिसकी प्रस्तुति वैज्ञानिक उपकरणों की सहायत्ता से होती है रंगमंच उसका दूसरा रूप है जो उसका पुर्ववर्ती है। पर सिनेमा की आषातीत उन्नती के बावजुद जिवित है। नाटक उपलब्ध होगा तभी तो वह रंगमच पर अथवा

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सिनेमा के माध्यम से प्रस्तुत किया जा सकता है। बंबई सिनेमा का आरंभिक केंद्र इसलिए बन गया क्योंकि वह पारसी थिएटर कंपनियों का केंद्र पहले बना व पारसी रंगमंच पर खेले गये नाटकों के निर्माता अभिनेता और गायक कालांतर मे सिनेमा की फिल्मो के निर्माता, अभिनेता तथा गायक बन गये। भारत में सिनेमा का उद्भव २० वी सदी के प्रारंभ के साथ हो गया था। सन १९१३ में भारतीय फिल्मों के पितामह दादासाहेब फालके की पहली फिल्म राजा हरिश्चंद्र प्रदर्शित हुई तद्पश्चात भारतीय सिनेमा उन्नती के पद पर अग्रेसर होता चला गया। इसलिए कुछ दशकों से विश्व के समस्त फिल्म निर्माताओं को साहित्य ने फिल्म के निर्माण के लिए अपने और आकर्षित किया है। साहित्य और सिनेमा का रिश्ता समय के साथ जादा घनिष्ट और सुंदर होता चला गया दर्शको का साहित्य के प्रती बढता रुजान ही साहित्य को सुनहरे परदे पर आने की अनुमति दे पाया है। बात चाहे प्रसिध्द लेखक विलियम शेक्सपिअर या रस्कीन बोण्ड या रविंद्रनाथ टागोर की हो भारतीय सिनेमा ने विश्व के विभिन्न साहित्य से प्रेरणा ली है फिर की फिल्म निर्मातों का भारतीय साहित्य की और झुकाव अधिक स्पष्ट नजर आता है। सिनेमा के सहयोग के साहित्य भी प्रभावित तथा अधिक लोकप्रिय बनता है। कितनी ही साहित्यिक कृतिया फिल्मकरण के बाद लोकप्रियता के आकाश को छु चुकी है। भिष्म सहानी का उपन्यास 'तमस' फिल्मीकरण के बाद कई संस्करणों में बिका। भगवती चरण वर्मा के उपन्यास 'चित्रलेखा' को भी फिल्म् बनने के बाद बड़ी लोकप्रियता मिली। भारतीय सिनेमा कुछ लेखको की शानदार रचना को बडे ही आकर्षिक रूप में दर्शको के सामने रखा है।

वर्षे 1960-70 के दशक में गुलशन नंदा के उपंन्यासो पर आधारीत कुछ फिल्में बनी उसमें 'कटी पतंग' 'निल कमल' 'खिलोना' व 'शर्मिली' को दर्शकों को द्वारा सराहा गया गुलजार की 'मासुम' समेत कुछ अन्य फिल्मे मन्नु भंडारी व बासु चर्जी कृत 'रजनी गंधा' और राजेद्र यादव बासु चटर्जी कृत 'सारा आकाश' आदी की पटकथा पर आधारीत है। अनेक उपन्यासों, कहानिओं तथा नाटकों पर जो फिल्में बनी हैं वे साहित्य से फिल्म के गहरे रिश्ते को रेखांकित करती हैं स्वतंत्रता से पूर्व भी बहुत से निर्माता निर्देशकों ने हिन्दी साहित्यिक कृतिओं को फिल्माने के प्रयास किए थे जिससे सफलता असफलता दिखाई देती हैं। फिल्म निर्माताओं के लिए साहित्य को फिल्म में रूपांतरित करना चुनौती पूर्ण कार्य है। संवाद,भाषा पहनावा, संस्कृति, कथानक आदि के चलते साहित्य की उस रचना में कुछ परिवर्तन करने के पश्यात ही उसे फिल्म का रूप दिया जाता है। जब किसी रचना का रूपांतरण किया जाता है तो ऊसमें कुछ बदलाव आना सभाविक है। फिल्म निर्माताओ के लिए एक लंबे उपन्यास को तीन घंटे की फिल्म में रूपांतरित करना एक कठिन कार्य है। फिर भी दर्शकों तथा फिल्म निर्माताओं ने फिल्म निर्माण के लिए साहित्य को पहली पसंद माना है। आज सिनेमा व साहित्य की सबंधात्मक अवधारनाए विभिन्न हो गयी है लेकिन स्थूल रूप में एक अच्छे निर्देशक की साहित्यिक कृति को मूल रूप में रखते हुए उसे ऐसा नया रूप देता है कि जिससे वह जीवंत और प्राणवान हो उठती है। कई उपन्यास कारों की कृतिया साहित्यिक रूप में उतना लोगों तक नहीं पहुच पायी जितनी सिनेमा माध्यम से। सिनेमा ने उस कृति को एक नवीन आयाम दिया। आज सिनेमा व साहित्य की संबंधात्मक अवधारनाए विभन्न स्तरों पर विभिन्न हो गयी हैं लेकिन स्थूल रूप में एक अच्छे निर्देशक की साहित्यिक कृति

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पर आधारित फिल्म ने जनमानस को सिनेमा की असली ताकत से परिचित तो कराया हैं। भीष्म साहनी द्वारा लिखे गए उपन्यास 'तमस का उदाहरण इस संदर्भ में प्रासंगिक है।

गंभीर सिनेमा के निर्माण में सृजनात्मक साहित्य की अहम भूमिका है। साहित्य पर आधारित फिल्मों को दर्शकों ने हमेशा सराहा है, जिससे साहित्य और सिनेमा का गहरा संबंध स्पष्ट होता है। सिनेमा ने साहित्यिक कृतियों को व्यापक जनसमुदाय तक पहुँचाने में महत्वपूर्ण योगदान दिया है। यह माध्यम उन लोगों को भी साहित्य से जोड़ता है जो इससे अपरिचित होते हैं। भविष्य में भी सिनेमा साहित्य से प्रेरणा लेकर समाज को दिशा देता रहेगा।

निष्कर्ष

साहित्य और सिनेमा के बीच गहरा और अविभाज्य संबंध है। साहित्य समाज का दर्पण है और समाज की अनुभूतियों, विचारों तथा परिवर्तनों को व्यक्त करता है, जबकि सिनेमा एक प्रभावशाली दृश्य-श्रव्य माध्यम है, जो साहित्य को व्यापक जनसमुदाय तक पहुँचाने में सहायक बनता है। दोनों ही कलाओं का मुख्य उद्देश्य समाज को दिशा देना, उसमें सकारात्मक परिवर्तन लाना और मनोरंजन के साथ-साथ जागरूकता फैलाना है। साहित्य और सिनेमा का परस्पर प्रभाव स्पष्ट रूप से देखा जा सकता है। अनेक साहित्यिक कृतियाँ फिल्मों का आधार बनी हैं, जिससे वे और अधिक लोकप्रिय हुई हैं। सिनेमा ने कई साहित्यिक रचनाओं को एक नए आयाम में प्रस्तुत किया है, जिससे वे जनसामान्य के बीच व्यापक रूप से स्वीकृत हो सकी हैं। गुलशन नंदा, मन्नू भंडारी, राजेंद्र यादव, भीष्म साहनी आदि के उपन्यासों पर बनी फिल्में इस संबंध को सिद्ध करती हैं।

साहित्य और सिनेमा दोनों ही समाज को प्रभावित करने की अद्वितीय क्षमता रखते हैं। साहित्यिक कृतियों का फिल्मांकन एक चुनौतीपूर्ण कार्य है क्योंकि उसे दृश्यात्मक रूप में ढालने के लिए आवश्यक परिवर्तन करने पड़ते हैं। फिर भी, अच्छे निर्देशक और पटकथा लेखक मूल साहित्यिक संवेदनाओं को बनाए रखते हुए सिनेमा को एक जीवंत स्वरूप प्रदान करते हैं।

अतः यह स्पष्ट होता है कि सिनेमा और साहित्य एक-दूसरे के पूरक हैं। साहित्य सिनेमा को गहराई और उद्देश्य प्रदान करता है, जबकि सिनेमा साहित्य को व्यापक दर्शक वर्ग तक पहुँचाने का सशक्त माध्यम बनता है। भविष्य में भी सिनेमा साहित्य से प्रेरित होकर समाज को नई दिशा देने में महत्वपूर्ण भूमिका निभाता रहेगा।

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Original Article

The Effect of Vermicompost Produced from Garden Waste on the Growth and Yield of Chilli (*Capsicum annuum* L.) Under Field Conditions

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Abstract:

Vermicompost is a nutrient-rich organic fertilizer produced through the decomposition of organic waste by using earthworms. Vermicomposting is the best method for recycling achieving sustainable solid waste management. Vermicompost is environmentally and economically one of the most suitable and friendly organic fertilizers for the sustainability of agriculture it is essential for food security and society. The Vermicompost significantly enhance the yield and quality of crops. The current study aimed to understand the effect of Vermicompost on the growth and productivity of chilli plants and the physicochemical properties of soil for this Eisenia fetida species of earthworm used for the production of vermicompost. The Vermicompost-treated plots are compared with the untreated control. Pots were planted with chilli and the growth of the chilli plants and the physicochemical properties of the soil were. The findings of the present study show the positive effect of Vermicompost on all growth parameters of chilli such as the rate of seed germination (94 % to 96 %) and the height of the plant (24 cm to 29 cm). Significant increments in the number of fruits per branch, length of shoot, weight of fruit, number of leaves, leaf area and number of branches, more robust root system and 30 %to 40 % more fruit yield were observed in chilli plants after the treatment of Vermicompost in treated plots test plants than the control plots plants. The Vermicompost treated plot shows the disease incidence on fruits was less compared with control plots/fields. The conclusion of the present study indicates Vermicompost is a viable, sustainable and effective bio fertilizer for chilli and soil.

Keywords: *Earthworm, Chilli, Vermicompost, Eisenia fetida, Bio fertilizer and Soil*

Introduction:

Chilli is one of the world's largest vegetable crops. It is a rich source of vitamins C and antioxidants. It helps to improve digestive health metabolism and cardiovascular health. Vermicomposting is a sustainable technique for solid waste disposal **(Chandan Singh Ahirwar and Azad Hussain 2015)**. Chilli is used in daily food it helps to reduce the risks of cancer and fights against fungal infections, Colds, and the Flu. Chilli (*Capsicum annuum* L.) can be grown under diverse soil and climatic conditions. The vermicomposting method of MSW management is gaining interest in the reduction of chemical fertilizer to maintain soil fertility **(Sriramulu Ananthakrishnasamy 2019)**. The use of huge amounts of chemical fertilizers in agriculture is creating problems for the environment and human health. Organic manure (Vermicompost) is an eco-friendly, economically viable and ecologically sound practice that plays a significant role in soil biology, chemistry and physics **(Preeti Shrimal and T. I. Khan 2017)**. Vermicompost improves the soil structure while preparing a suitable environment for plant growth as well **(Mustafa Ceritoglu and Murat Erman 2018)**. The application of Vermicompost to improve the physical properties of soils is a promising technology to meet the requirements of high plant growth and cost-effective recovery **(Bhati Pravesh and Shouche Shobha 2017)**.

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There is a need to find an alternative to chemical fertilizers that will be suitable for the environment and man. Vermicomposting appears to be the most promising as a high-value organic fertilizer which not only increases plant growth and productivity by nutrient supply but is also cost-effective and pollution-free **(S. Illanjiam and T. Ramesh 2021).** Organic fertilizer plays an important role in worldwide agricultural lands. Nowadays many people like to produce organic vegetables **(S. Nancy Celes 2018).** Vermicompost could be used as an excellent soil amendment for main fields and nursery beds and has been reported to be useful in raising nursery species plants **(Goutam Kumar Chanda 2011).** The chemical fertilizers and insecticides reduced soil fertility and caused health problems for man. Using biological fertilizers such as Vermicompost increases quality and sustainability, in addition to preserving the environment **(Kader et. al., 2002).** The application of Vermicompost improves the physical and chemical properties of the soil by decreasing bulk density and increasing the soil water-holding capacity. Chilli (*Capsicum annuum* L.) is one of the major commercial vegetables largely grown in India both as green vegetable fruits and dry chilli in the form of spices **(Ankaram S.R 2013).** Vermicompost is the most important biological fertilizer. The effects of Vermicompost + NPK are more efficient for eggplants and maintenance of the soil environment and also economically suitable **(G. Manimegala and G. Gunasekaran 2020).** The present study investigated the effect of Vermicompost on the growth and yield of Chilli *(Capsicum annuum* L.*)* under field conditions.

Materials and Methods:

Study Area:

The field experiment was conducted at the botanical garden of Shri Mulikadevi Mahavidyalaya, Nighoj, Tal-Parner, Dist. Ahmednagar-414 306

Vermicompost Production:

The garden waste collected and processed using earthworm (*Eisenia fetida)* to produce Vermicompost at the Vermicompost unit developed by the Department of Zoology, Shri Mulikadevi Mahavidyalaya, Nighoj, Tal-Parner, Ahmednagar district (M.S) India is located between longitude-74°17'34.33"E (74.292875) and latitude-18°57'59.26"N (18.966462).

Soil analysis:

Before and after the experiment the soil samples were taken from both the plots fields of each field (Site 1, Site 2 and Site 3). The pH of the soil samples was determined by using a digital pH meter and the moisture content, Phosphate, nitrogen, potassium and organic carbon in the soil samples were analyzed by using a soil testing kit.

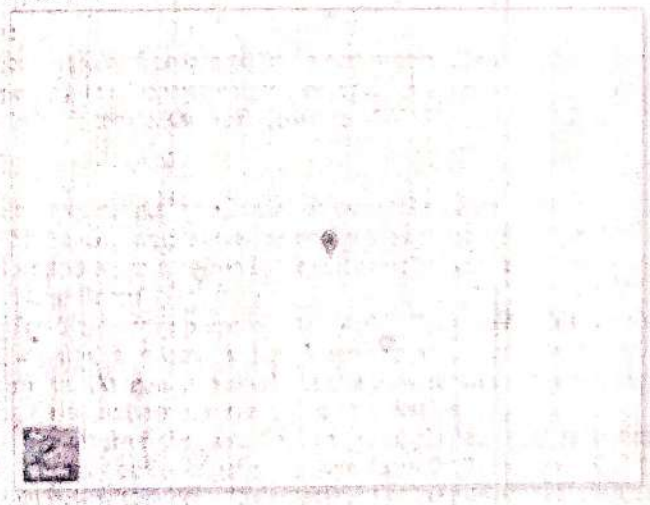
Experiment under the field Condition:

The experimental plots fields were prepared (4 ft. 4 ft.) Four plots fields were used for the experiment with Vermicompost and 01 field was used as control without Vermicompost. Studies were conducted to compare the effects of Vermicompost on plant growth. At regular intervals, the fields were watered depending on the requirements.

Method for Data collection, data analysis and recording observation:

The seedlings were bought from the same field and were planted at the same time in both fields. Chili plants are randomly selected from the sites of the experiment from June- 2022 to May- 2023 (three main seasons January-February, June – July and September- October). The assessment of the rate of seed germination, height, no of branches, no of leaves, no of fruits per branch and the weight of fruit were measured at regular intervals.

Location of Study: Photo image no.1



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Photo image no. 1: Satellite Photo image of the Botanical garden of Shri Mulikadevi Mahavidyalaya, Nighoj, Tal-Parner, Ahmednagar district (M.S) India

Results:

Vermicompost is a highly effective bio fertilizer widely used in agricultural systems due to its ability to enhance soil health and productivity. Its application significantly improves the physical and chemical properties of soil, increasing organic matter content and Rich in essential nutrients such as nitrogen, phosphorus, and potassium. These components not only enhance nutrient availability but also stimulate microbial activity, fostering a more robust soil ecosystem. When applied in production areas, it directly contributes to improved plant growth, higher crop yields, and enhanced fruit quality, while also promoting long-term soil fertility and resilience.

Table No. 1: Physicochemical Properties of soil treated with Vermicompost in different sites from the study area.

Sr. No	Parameter	pH	OC (%)	N (kg/ha)	P (Kg/ha)	K (Kg/ha)	Moisture (%)
1	Site1	6.90± 0.188	0.58± 0.269	177.10± 21.974	8.68± 4.624	384.67± 69.859	90.67± 1.528
2	Site 2	7.00± 1.048	0.67± 0.361	176.44± 49.360	10.21± 2.159	238.67± 28.711	91.67± 3.512
3	Site 3	7.67± 0.143	0.67± 0.218	188.96± 28.814	10.87± 6.300	221.67± 45.325	88.67± 2.082

Data Presented as Mean ± Standard Deviation. The means were obtained from three replicates. (N=3) pH, OC: Organic Carbon, N: available Nitrogen, P: available Phosphorous and K: available Potassium.

Table No. 2: Physicochemical Properties of soil control (Non-Vermicompost) in different sites from the study area.

Sr. No	Parameter	pH	OC (%)	N (kg/ha)	P (Kg/ha)	K (Kg/ha)	Moisture (%)
1	Site 1	7.20± 0.195	0.63± 0.142	203.40± 61.401	8.05± 4.189	306.33± 169.795	88.33± 2.055
2	Site 2	7.44± 0.465	0.85± 0.050	154.06± 21.313	12.73± 3.474	216± 90.139	92.33± 3.786
3	Site 3	7.50± 0.362	0.78± 0.159	170.19± 31.346	11.81± 4.931	202.67± 68.245	82.67± 5.033

Data Presented as Mean ± Standard Deviation. The means were obtained from three replicates. (N=3) pH, OC: Organic Carbon, N: available Nitrogen, P: available Phosphorous and K: available Potassium.

Table No: 3 Growth characteristic of Chilli (*Capsicum annum* L.) Plants treated with Vermicompost

Sr. No	Growth Characteristic	Rate of Seed Germination	Height of plant (cm)	No of Branches	No of leaves	No of fruits per branches	Weight of fruits (gm)
1	Site 1	95%	28 cm	08	13	9	2.5±03.05
2	Site 1	96%	26 cm	6	11	8	3.5±04.00
3	Site 3	94%	26 cm	8	14	9	2.6±03.02

Data Presented as Mean ± Standard Deviation. The means were obtained from three replicates.

Table No: 4 Growth characteristic of Chilli (*Capsicum annum* L.) Plants of control Non-Vermicompost

Sr. No	Growth Characteristic	Rate of Seed Germination	Height of plant (cm)	No of Branches	No of leaves	No of fruits per branches	Weight of fruits (gm)
1	Site 1	89%	22 cm	5	8	4	1.5±2.00
2	Site 1	89%	20 cm	6	9	6	1.2±2.00
3	Site 3	90%	19 cm	5	10	5	1.6±02.02

Data Presented as Mean ± Standard Deviation. The means were obtained from three replicates.

Conclusion:

The present study shows that Vermicompost is a highly effective and sustainable fertilizer for chilli production. The study indicates the application of Vermicompost improves, crop growth and yield of the crop but also enhances soil health. The most important growth is observed in the production of crops. In conclusion, Vermicompost has a potential bio fertilizer for sustainable agriculture practices.

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HUMAN RESOURCE DEVELOPMENT ON ECONOMIC GROWTH

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Abstract

Among the various resources available within a country, human resources are distinctly recognized as the most valuable asset, embodying the nation's wealth. Their role assumes paramount importance in facilitating economic development. Effective planning and strategic management of human resources are crucial for achieving social progress and advancement. It is essential to reassess priorities, focusing on the utility of the population as a resource rather than solely on population size. The educated and knowledgeable segments constitute this vital resource, available only throughout an individual's lifetime. Skilled individuals epitomize the nation's genuine wealth, providing sustained benefits. Although concerns regarding the longevity of this wealth exist, educated, trained, and skilled persons remain the primary resource. Furthermore, the potential risk of uneducated populations becoming a burden on the country underscores the undeniable significance of human resources, highlighting their critical role in national development.

Introduction

The economic prosperity, standard of living, cultural advancements, scientific progress and technological innovations of a nation are intricately linked to its development. The foundation of these aspects lies in the resources available within the country, broadly classified into natural, financial and human resources. Previously, limitations in exporting goods and accessing raw materials from other countries restricted progress. As various facilities became available and financial assistance options expanded, natural and financial resources gained significance. Nevertheless, human factors remain crucial in achieving industrial excellence. Human imagination, creativity and labor continue to drive development. The significance of human resources stems from their role in shaping national culture through knowledge, intelligence and experience, ultimately influencing historical progress. Human participation is vital for national advancement, as emphasized by Meyer's statement, "The greatest natural resource of our country is its people."

Objective of the study

1. To understand the concept and importance of human resource development and human capital formation.

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2. To analyze the relationship between human resource and economic development.

Research Methodology: The type of research paper presented is descriptive and analytical.

Method of Data Collection:

Secondary Data Collection: Secondary data collection involves collecting existing data from various sources. These data collection methods include literature reviews, analysis of academic journals and books and existing statistics, reports and government records.

Meaning of Human Resources Development: Natural resources and physical capital are essential for economic development. But on the other hand, unless the quality of the people handling this capital improves, even an increase in physical capital will not bring sufficient benefits.

In the 21st century, society has transformed into a knowledge-based entity, enabling countries to explore alternative development pathways despite constraints in natural and financial resources. Consequently, accessing financial capital and modern technology from developed nations has become increasingly feasible. However, the cultivation of human resources within a country remains crucial, as it underpins all social processes and ultimately determines national efficiency. Therefore, human resources play a vital role and cannot be overlooked.

Some Definitions of Human Resource Development -

1. **Michael Armstrong** - Employees development often referred to as Human Resourses Development is about provision of learning development and having opportunity in order to improve individual team and organizational performance.
2. **Biswajeet Patanayak** - Human Resources development is a continuous process to ensure the developent of employee's dynamism, effectiveness, Competencies, and motivation in Systematic and planned way."

History of Human Resource Development:

Human development's theoretical foundations have their roots in ancient philosophical and early economic thought. Aristotle's insightful assertion, "wealth is not the good we seek, for it is only useful for other things," laid initial groundwork. Subsequently, influential thinkers Adam Smith and Karl Marx emphasized human potential, contributing to the theory's evolution. The concept gained significant prominence in the 1980s through Amartya Sen's seminal work, which highlighted human potential and ultimately earned him the 1998 Nobel Prize in Economics. Notable economists Mahbub-ul-Haq and Amartya Sen played pivotal roles in shaping modern human development theory. Their contributions paved the way for further advancements. A notable expansion of the theory occurred in 2000 when Sen, collaborating with Sudhir Anand, addressed pressing concerns regarding sustainability. This development enhanced the theoretical framework, providing deeper insights into human development's complexities.

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Purposes of Human Resource Development: The purposes of human resource development can be summarized as follows:

1. Human resources are vital to organizational success, whether in social, educational or business contexts. Capable and motivated individuals drive achievement of organizational goals, underscoring the importance of human resource development.
2. Educational institutions require personnel with diverse abilities, including knowledge, technical skills, relational expertise and attitude. Identifying and addressing deficiencies in these areas is crucial.
4. Adapting to societal changes, shifting needs, evolving goals, policies, student expectations and technological advancements necessitates acquiring new knowledge.
6. Periodic evaluation and training enable personnel to address emerging challenges.
7. Future-focused planning enables organizations to adapt.
8. Motivation enhances work quality, emphasizing its significance in human resource development.
9. Fostering cooperative environments and team building promotes proactive engagement, risk-taking and creative problem-solving.

Measuring Human Development: Human development encompasses six foundational pillars:

1) **Equity:** Ensuring fairness and equal access to education, healthcare and opportunities for all individuals, regardless of gender.
2) **Sustainability:** Promoting equitable distribution of resources, safeguarding environmental integrity and ensuring sustainable livelihoods.
3) **Productivity:** Fostering full participation in economic activities, driven by effective government social programs.
4) **Empowerment:** Enhancing individuals' freedom to influence decisions impacting their lives, promoting autonomy and self-determination.
5) **Co-operation:** Encouraging community engagement, mutual support and social cohesion.
6) **Security:** Providing a stable environment, protecting human rights and ensuring opportunities for safe, sustainable development.

Formation of Human Resources:

Human capital formation is crucial for economic development, as effective utilization of natural and physical resources relies on skilled workers. Enhanced worker quality drives economic growth, a notion supported by notable economists Schulz, Herbison, Denison, Kendrick and Md. Galbraith, who attribute America's rapid industrial growth to increased capital investment, primarily human capital. Investments in individual development, including education, healthcare and social services, constitute human capital formation. Expenditures on education, training programs, medical treatment and healthcare

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initiatives are also considered essential components. These strategic investments foster economic progress through human development, ultimately contributing to a nation's prosperity.

Human Capital Formation - Human capital is the improvement in the quality of workers (individuals) and productive investment made to improve this quality is included in human capital formation.

According to Habison - "Investment made for the development of the individual as a productive and productive tool is human capital formation." Human capital formation is an art that increases the productivity of workers.

1) **Providing health facilities:** Health facilities improve the quality of life of workers (individuals), thereby increasing their healthy life expectancy and increasing their capacity and vitality.
2) **Providing training:** provides employment opportunities. Such as training increases the skills of workers.
3) **Providing education at all levels:** Providing primary, secondary and higher education.
4) **Providing adult education:** Providing education for adults to study, through adult education and extension programs.
5) **Providing proper facilities for migrant workers:** Providing proper facilities for migrant workers to adapt to new employment.

Role of Human Capital in Economic Development: Human capital is a fundamental source of economic growth. It is a source that leads to an increase in productivity and technology and this is the important differences between developed and developing countries. The quality of human capital in developed countries has increased, while in developing countries this quality is at a low level, which is why their development is low. The role of human capital in economic development can be explained as follows.

1) **It inspires research and development:** Controlling the emigration of intelligent specialists and technicians, human capital inspires research and economic development. Therefore, many mysterious inspiring effects occur in the economy. Human capital encourages scientists and technicians to develop new technologies, as well as university research, research in other institutions and new scientific experiments. It has a very good effect on the intellectuals and scientific environment of its country. Also, human capital production can control the emigration of scientists, technicians, etc. in the country.
2) **Helps in controlling population growth:** The process of human capital creation leads to an increase in educational attainment, which increases the literacy rate. Especially the increase in female literacy rate has a positive impact on population growth (birth rate and infant mortality, maternal mortality, death rate). If we consider a high level of

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literacy, it helps the country in controlling birth rate, infant mortality, maternal mortality, and consequently, the population growth of the country can be controlled.

3) **Increases the efficiency of people:** Due to the increase in health literacy, the health of human capital increases, which increases the life expectancy of people. Also, the increase in the literacy of human capital improves nutritional intake. Due to the increase in the quality of nutritious diet, the physical and intellectual efficiency of people increases, which helps in economic development in the world.
4) **A high standard of living can be achieved:** Life expectancy increases due to large-scale capital formation of people. And the literacy rate decreases the infant mortality rate and maternal mortality rate. Therefore, the quality of life of the people of the country definitely increases. The alternative objective of economic activity is to raise the quality of life of the people.
5) **Adequate utilization of the country's resources:** Adequate utilization of the available capital and natural resources of the country depends on the human resources that use them, so it is very necessary to increase investment in human capital.
6) **High rate of return:** Investment in human capital gives long and very long-term returns. Therefore, it is necessary to modernize human capital, which is also a long-term investment.
7) **Improvement in the quality of labor:** Economic development does not only depend on the organization of labor working in various fields, but also on the quality of labor. The quality of labor plays an important role in economic development. Therefore, improving the quality of labor is an essential tool for development. The increase in the quality of labor is both a cause and an effect of development.

Summary –

The level of development of any country depends on the composition of the labor force in that country. If the labor force in a country is not educated, trained, skilled, then there are limitations in achieving the level of development in that country. Supply of labor with different education and skills according to the needs of the economy is essential for the development of the country. Therefore, human capital is a labor force with different levels of education, training and increasing skills. The supply of such labor force is health care. On-the-job training, primary and other levels of education, adult education, education received through extension programs in agriculture, migration of individuals according to changing employment opportunities, through which skilled, healthy capital is created in large quantities.

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