SUNFLOWER PRODUCTION AND ITS FUTURE STRATEGIES - AN EMPIRICAL ANALYSIS

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Abstract: **India is an agriculturally important country. Two-thirds of its population is engaged in agricultural activities. Agriculture Sector provide food security for the entire population. Oil seeds / edible oils are next to food grains. Oilseed sector occupies a unique position in Indian agriculture. The country is one of the largest producers and exporters of oilseed in the world. The importance of oilseed arises from the fact that it is the chief source for supply of fat to the human beings and oil cake to the domesticated animals. Among the oilseed crops, groundnut, sunflower, safflower, rapeseed-mustard, sesame, niger and soybean are the major ones. Sunflower is an important oilseed crop in India popularly known as "Surajmukhi." The objective of this paper is to analyze the trends in the area sown, production, and yield rate of Sunflower in India. The growth rates, and research methodologies are estimated using Statistical Techniques. State-wise analysis has also been carried out. It is concluded that to fulfill the demand of edible oil for ever growing population, constant efforts and proper technologies & strategies needs to be put in place for higher production and productivity.**

Keywords: **Oilseed, Sunflower, Growth Rate, Production, Yield**

I. INTRODUCTION

Agriculture is an integral part of the world's economy, mainly for developing countries. It is the primary source of employment, income, and food, and these basic needs fulfilled by agriculture all over the world. Agriculture sector plays a predominant role in India. Agriculture Sector provide food security for the entire population. Oil seeds / edible oils are next to food grains. Sunflower (Helianthus annuus L.) is an important oilseed crop in India popularly known as "Suraj-Mukhi." It is known as sunflower as it follows the sun by day, always turning towards its direct rays. Sunflower is a common oilseed of India with wider utility. It is used as a source of edible oil, and as raw material for Agri-based industry. Botanically it is known as Helianthus annus and belongs to the family Asteraceae.

II. METHODOLOGY

The objective of this study centers on the cultivation of Sunflower crop. However, specific objectives of this study are given below:

- To understand the growth trend of oilseed production over the years, especially the sunflower crop
- To identify the major constraints faced by sunflower cultivation/production
- To recommend some possible suggestions to overcome the difficulties faced by the sunflower farmers

This study is based on the secondary data pertaining to edible oilseed sector, particularly sunflower crop. In order to comprehend the growth trend, the study analyses a disaggregated time series data from 1970 to 2020 for Sunflower of the states and the country. The following formulae were used:

Growth Rate
The moving averages have been used to estimate growth rates.

$$R_t = \frac{Y_1 - Y_0}{Y_0} * 100$$

Where R_t is the simple growth rate during two periods

Projection

Least Square Technique has been applied for the following linear model:

$$y = a + b\ x$$

Where y is Sunflower production
  a is constant
  b is regression of y on x,

x is year (x=1 for 1995-96
 =2 for 2000-01 & so on)

3 Year Moving Average

The moving averages have been estimated using the following formula:

$$y_{i+1} = \frac{(y_i + y_{i+1} + y_{i+2})}{3}$$

III. RESULTS & DISCUSSIONS

Sunflower is one of the most important oilseed crops grown in temperate countries. It is a major source of vegetable oil in the world. In India, it has gained popularity due to the national priority of vegetable oil production. India is one of the largest producers of oilseed crop in the world. Oilseed occupy an important position in the Indian Agricultural Economy. Table-1 presents the three yearly averages of area sown, production and yield rate for Sunflower. It is seen that there is a positive trend in area sown and production during 1970-71 to 1990-91. The area sown is declined to 0.25 M ha during 2020-21 from 1.64 M ha during 1990-91. Similarly, the production has also come down from 0.9 M tones in 1990-91 to 0.23 M tones in 2020-21. The yield rate has positive trend. It has increased to 949 kg per ha in 2020-21 from 653 kg per ha in 1970-71. Annual Growth rates have also been estimated. This table also shows annual growth rates during different periods. The highest growth rate was observed in area sown (99.33%) and production (90%) during 1980-81 to 1990-91.

Table -1   3 years moving average of area, production and Yield of Sunflower

| Year	Area Sown M ha	Growth rate per annum	Production M Tones	Growth rate per annum	Yield Kg per ha	Growth rate per annum
1970-71	0.12		0.08		653	
1980-81	0.15	2.50	0.09	1.25	546	-1.64
1990-91	1.64	99.33	0.9	90.00	543	-0.05
2000-01	1.18	-2.80	0.67	-2.56	573	0.55
2010-11	1.05	-1.10	0.67	0.00	662	1.55
2020-21	0.25	-7.62	0.23	-6.57	949	4.34
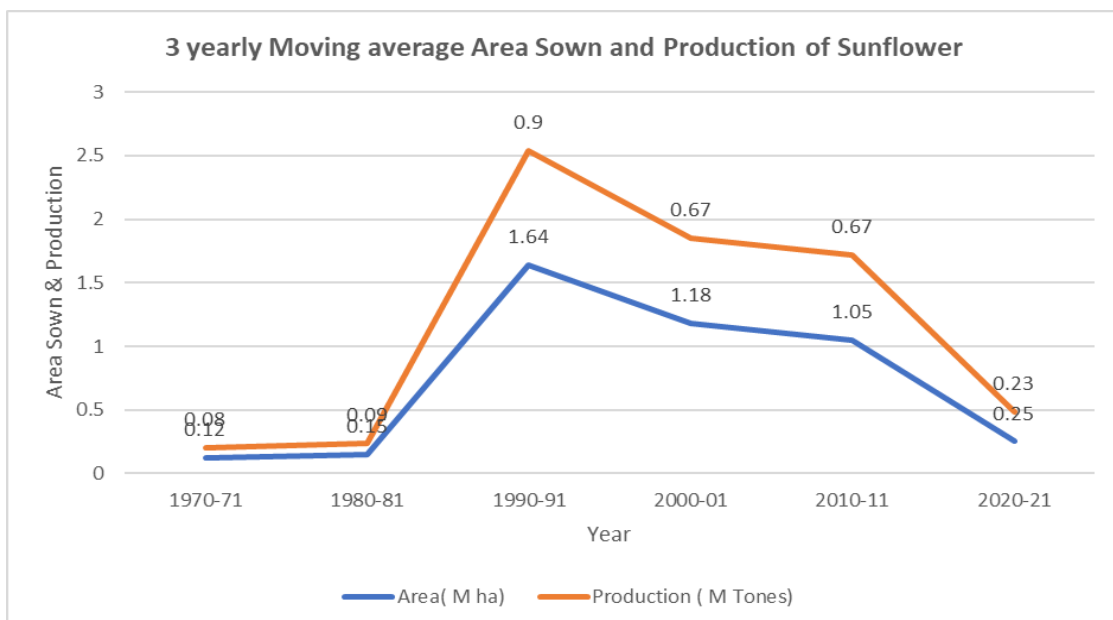
The state-wise break up of area sown, production and yield rate of Sunflower is depicted in Table –2. It is seen that Karnataka is the highest Sunflower producing state (47.8%) of the total Sunflower in the country. Karnataka along with Telangana, Odisha, Haryana and Maharashtra produce about 83% production in the country. The highest yield rate of the order of 2341 kg per ha has been observed in Telangana, followed by Haryana (2004 Kg per ha) and Odisha (1340 Kg per ha) and lowest 463 Kg per ha in Maharashtra.

Table –2 Area, Production and Productivity of Sunflower for Major States (2020-21)

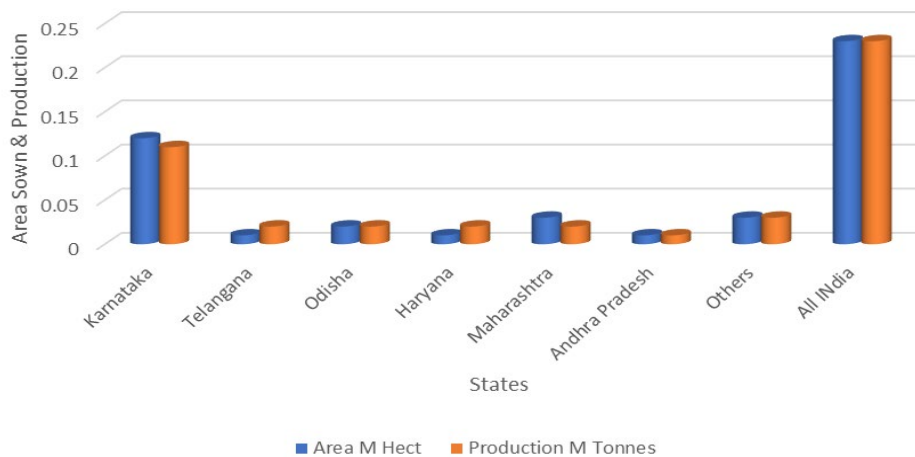| States	Area Sown M ha	%age of Total Area	Production M Tones	%age of Total Production	Productivity Kg per ha.
Karnataka	0.12	52.17	0.11	47.83	898
Telangana	0.01	4.35	0.02	8.70	2341
Odisha	0.02	8.70	0.02	8.70	1340
Haryana	0.01	4.35	0.02	8.70	2004
Maharashtra	0.03	13.04	0.02	8.70	463
Andhra Pradesh	0.01	4.35	0.01	4.35	692
Others	0.03	13.04	0.03	13.04	1153
All India	0.23	100	0.23	100	1011
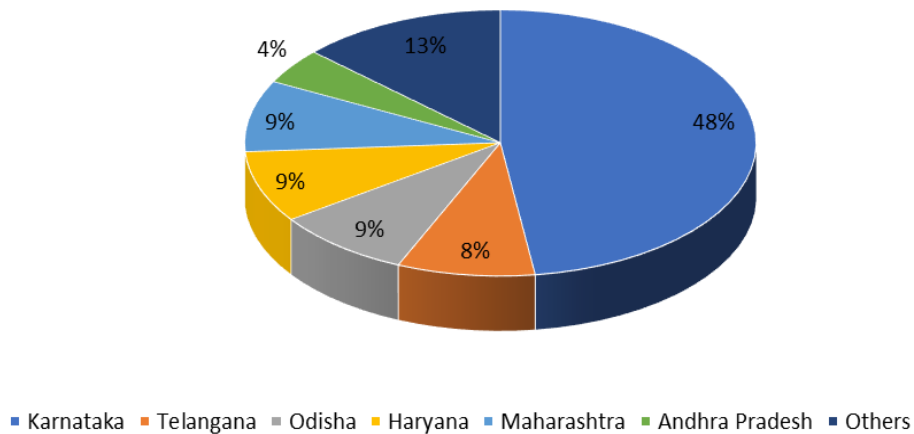
Table -3 presents the major Sunflower producing countries in the world. It is seen, that Russia is the world's largest Sunflower producer with 28% share followed by Ukraine. Russia and Ukraine together accounting for more than 56% of world's Sunflower production.

Table 3: Major Sunflower Producing countries in the World (2019)

Country	Production M Tones	Production %age	Cumulative Production %age
Russia	15.38	28.31	28.31
Ukraine	15.25	28.07	56.38
Argentina	3.83	7.05	63.43
Romania	3.57	6.57	70.00
China	2.42	4.45	74.45
Turkey	2.1	3.87	78.32
Bulgaria	1.94	3.57	81.89
Hungary	1.71	3.15	85.04
France	1.3	2.39	87.43
Tanzania	1.04	1.91	89.34
India	0.21	0.39	89.73
Other Countries	5.58	10.27	100
Global	54.33	100	
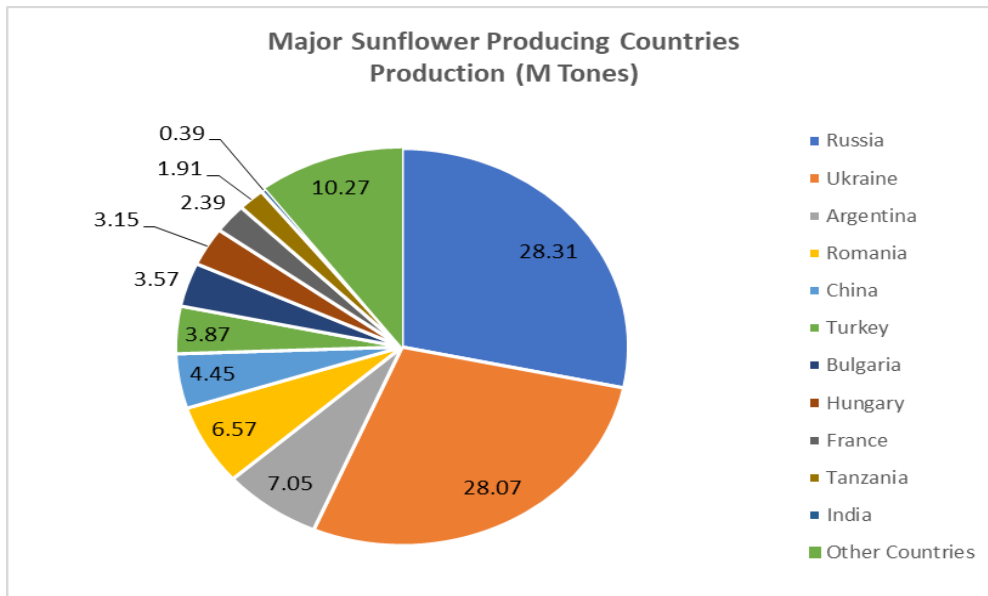
Table –4 Projected Yield for Sunflower

	2025-26	2030-31
Yield Kg per ha	907	970

Table - 4 presents the projected yield rate for Sunflower 2025-26 and 2030-31. The estimated yield rate will be 907 Kg per ha in 2025-26 and 970 Kg per ha 2030-31.

IV.   CONCLUSION

It is concluded that the area sown and production of the Sunflower has deceasing trend. There is need to develop necessary partnership among the stakeholders and encourage adoption of improved technologies. The convergence of the efforts of all the stakeholders will help in increasing area and production of sunflower in the country. Efforts are to be initiated to increase the yields and reduce the cost of cultivation by mobilizing the farmers to adopt good management practices to make sunflower farming profitable and increase the area and production

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