



# Trend analysis of Rapeseed/Mustard Crop in Rajasthan India and Across Global

Anuj Kumar<sup>1</sup>

Sunil Kumar<sup>2</sup>

Hemant Laxkar<sup>3</sup>

## Introduction:

Indian agriculture has undergone significant changes in its cropping pattern and technology know how over time. Started with the onset of Green Revolution in 1966 it gradually transformed in the beginning but received big boost, in not only technology but in institutional structure as well, especially after 1990s. The food grains were the most important in Indian agriculture since ages. In 1950-51 the gross cropped area was little less than 100 million hectares. This was less than 40 percent of the total land area of the country. The net cropped area was 140 million hectares in 2009-10 (after inclusion of multiple cropped area it goes up to 192 million hectares) which was around 46 percent of the country's total area of 328.73 million hectares while it was only 11 percent of land used for cultivation in the entire world. The decade of 1990s the Government of India was forced to lay greater stress on the production of oilseeds in the country as the scarcity of vegetable oils forced to import vegetable oils in huge quantity which drained out much required foreign exchange reserves. The Government of India came out with the programme of Technology Mission on Oilseeds in the country in 1986 which culminated into increase in area, production, and yield of oilseed crops. The area, production and productivity of various oilseed crops grown in India continued to increase after the 1990s. India has a place of pride by occupying 4<sup>th</sup> place in the production of oilseed crops in the world after USA, China, and Brazil. India accounts for 10-12 percent of world's oilseeds area and 6-7 percent of world's oilseed production. India produces nine major oilseed crops which are groundnut, rapeseed-mustard, soybean, sunflower, safflower, Niger, linseed, castor, and Sesamum. The five major states sowing rapeseed-mustard are Rajasthan, Uttar Pradesh, Haryana, Madhya Pradesh and West Bengal, which together claim nearly 80 percent of total country's area under this crop. Rajasthan stands at the top rank claiming more than 45 percent of country's area under rapeseed-mustard. Uttar Pradesh, Madhya Pradesh, Haryana, and West Bengal claim 11.81 percent, 11.84 percent, 8.41 percent, and 4.19 percent respectively.

In this chapter we are presenting the trends in the growth of area, production and productivity of Rapeseed/Mustard crops in the World and India vis-à-vis Rajasthan during the period 1980 to 2017-18. The CAGR are calculated with coefficient of variation to explain the relative importance of each crop in India and in the state of Rajasthan. For Rapeseed crop we have presented the growth rates in area, production and yield in figures and diagrams.

**Objective:**

- To estimate the trend analysis of Rapeseed/Mustard Area Production and Productivity in Rajasthan India and Global.

**Research Methodology:**

The study is calculated by secondary data. The data collection will be based on the records of the directorate of agriculture and DES (government of Rajasthan) and various reports and journals. The study would cover the area of Rajasthan based on the last four decade that is 1980 to 2017-18. There will be used CAGR model for calculate appropriate result. CAGR is related with growth rate, this is the supreme ways to calculate and found returns for anything result that can rise or decrease in value over by time. CAGR provides the one rate that defines the return for the entire measurement period.

The compound annual growth rate (CAGR) of area, production and yield of oilseeds were estimated as follows:

$$Y_t = Y_0 (1+r)^t \dots\dots\dots (1)$$

$Y_t$  denotes the observation (Mustard production, productivity and Area)

$$Y_t = A + Bt + \varepsilon \dots\dots\dots (2)$$

$$\ln Y_t = A + Bt + \varepsilon \dots\dots\dots (3)$$

Where,  $A = \ln(Y_0)$  and  $B = \ln(1+r)$

$Y_t$  = Area/Production/yield of major oilseeds in the  $i^{\text{th}}$  period,

$t$  = a time variable (1, 2, 3....., n) A and B are parameters to be estimated,

$r$  = compound growth rate, and  $\varepsilon$  =error term

**Analysis:****Area of Rapeseed/Mustard-**

Table 1.1 shows growth rates of area sown under rapeseed/mustard in the world, India and Rajasthan during the period between 1980 and 2017-18. The growth rate of sown area under rapeseed-mustard has shown an irregular behavior for both world and India. Though the growth rates were positive all through during the period under study, however, the path was rather bumpy. It reported as high as 64 percent in 1990-91 but reduced to just 13.5 percent in 2000-01. Again recorded high rate of growth of 48 percent in 2010-11 but went down to 11.7 percent in 2017-18.

Barring 2000-01 when the growth rate was negative to the extent of 23 percent, they have shown a positive trend in other periods in India. In India it was 41 percent in 1990-91 and 45 percent in 2010-11. There was significant fall in the growth rate of sown area under rapeseed-mustard in 2017-18 and was reported as 3 percent. In Rajasthan the picture is more unpredictable when the growth rate was unprecedented at 430 percent and soon became negative to the extent of 27 percent in 2000-01. During the first decade of the present century again there was spectacular growth rate of 77 percent in the sown area of the crop. Alas, this tendency could not be maintained in the next decade and in 2017-18 when growth rate became negative of 12.3 percent. This analysis shows that the behavior of sown area under rapeseed/mustard has been highly uneven in the world and so is the case for India and Rajasthan.

**Table 1.1: Growth rate of area of Rape/Mustard in the World, India and Rajasthan**

Year	World	Growth Rate	India	Growth Rate	Rajasthan	Growth Rate
<b>1980-81</b>	12553646	-	4112900	-	362522	-
<b>1990-91</b>	20538752	63.61	5782100	40.58	1918578	429.23
<b>2000-01</b>	23309026	13.49	4476700	-22.58	1403063	-26.87
<b>2010-11</b>	34476719	47.91	6506400	45.34	2489892	77.46
<b>2017-18</b>	38509853	11.70	6700000	2.98	2183046	-12.32

**Source- Agriculture Statistics of Rajasthan, Column of Growth Rate Calculated by Researcher**

Table 1.2 shows the share of area sown of rapeseed-mustard in the world, India and Rajasthan during 1980 to 2018. The reveals that India's share in sown area under rapeseed-mustard crop has been during the entire period continuously falling from as high as of 33 percent in 1980-81 to 19.21 percent in 2000-01 and thereafter to 17.4 percent in 2017-18. Rajasthan's share in the rapeseed-mustard sown area as percent to total India has witnessed a rising trend during this period. It was as low as 9 percent in 1980-81 which rose to 33 percent in 1990-91 and further to 37.3 percent in 2017-18. In terms of the share of Rajasthan in the world it was very low at 3 percent in 1980-81 but rose considerably and reached to almost 10 percent in 1990-91 but thereafter there were ups and down and finally stayed at 7 percent in 2017-18. Rajasthan plays very vital role in rapeseed-mustard crop in not only in India but in world as well.

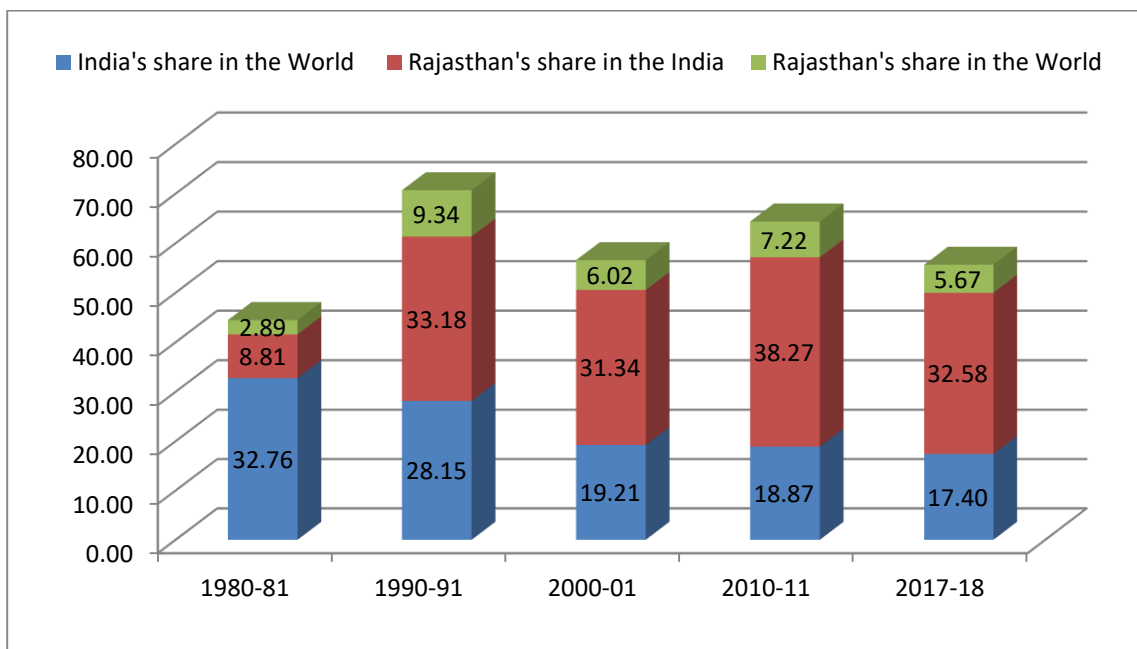
**Table 1.2: Share of area sown of Rape & Mustard in the World, India and Rajasthan**

Year	India's share in the World	Rajasthan's share in the India	Rajasthan's share in the World
<b>1980-81</b>	32.76	8.81	2.89
<b>1990-91</b>	28.15	33.18	9.34
<b>2000-01</b>	19.21	31.34	6.02
<b>2010-11</b>	18.87	38.27	7.22
<b>2017-18</b>	17.40	32.58	5.67

**Source - Calculated by Researcher from Table 1.1**

Figure 1(a) depicts the Table 1.2 in a divided bar diagram. The blue colored bars shown India's share in the world total sown area under rape/mustard crop during the last four decades. It is evident from the figure that India's share in total world in sown area of the crop has been falling continuously during the entire time period. Rajasthan's share is shown to have increasing continuously from 9 percent in 1980-81 to 33 percent in 2017-18. Thus Rajasthan has a lion's share in total sown area of rapeseed-mustard in the country.

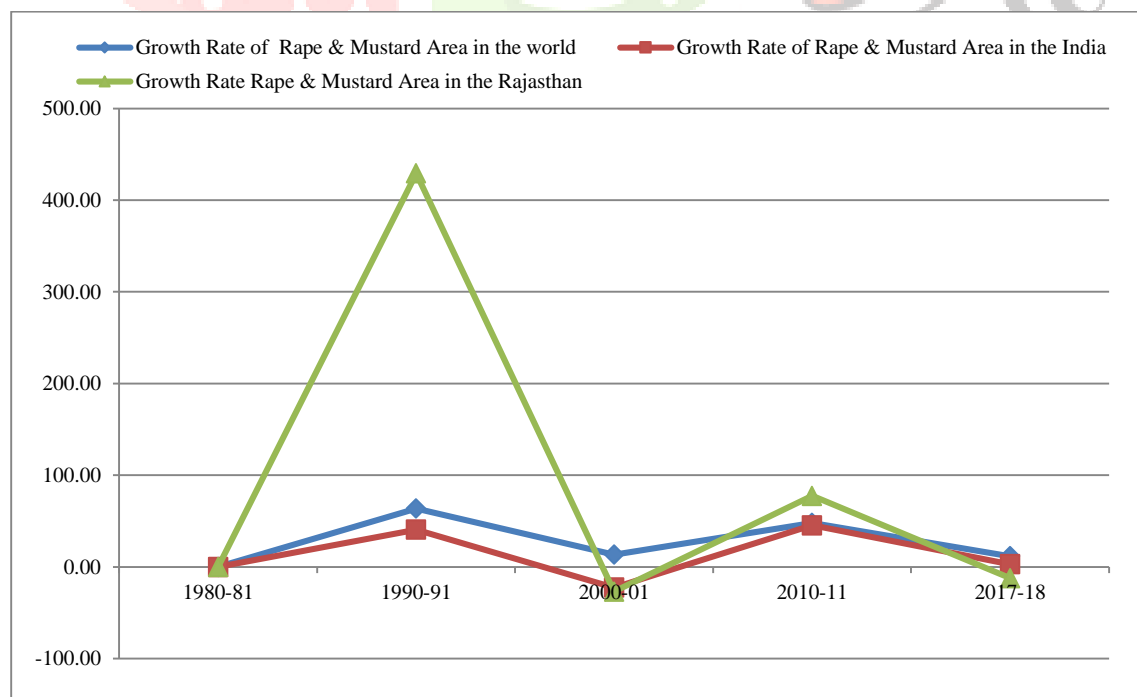
**Figure 1(a): Share of sown area of Rape & Mustard in the World, India and Rajasthan**



**Source – Table 1.2**

Figure 1(b) is a graph showing growth rate of rapeseed/mustard sown area in the world, India and Rajasthan. The graph lines in blue and red show growth rates of sown area under rapeseed-mustard in the world and India respectively which are toddling side by side to each other, showing ups and downs in the growth performance over the time period. The Indian growth rates have remained below to those for the World during the period under study. The growth performance for Rajasthan is interesting to study. The highest growth rate in sown area for the crop was registered in 1990-91. Perhaps the innovative programme of Technology Mission for Oilseeds launched by the Government of India in 1986 has helped the farmers in the state to grow more rapeseed-mustard in place of other food grain crops. Since 2000-01 there has been steady rise in the growth performance in the state. The growth rates registered for Rajasthan were higher than those for the country as well as the world.

**Figure 1(b): Growth Rate of Rape & Mustard Area in the World, India and Rajasthan**



**Source – Table 1.2**

### Production of Rapeseed/Mustard-

Rapes/mustard is important oilseed crop world over and India is a very prominent producer. It has multipurpose uses. Besides providing edible oil for human consumption, it is used as animal feed and biodiesel. Table 1.3 gives growth rate of production of rapeseed-mustard in the world, India and Rajasthan for last four decades. The growth in production of rapeseed-mustard for the world shows a falling trend all through except 2010-11 and was estimated at 19.5 percent in 2017-18. For India the growth rates are reported to be on declining trend, however, were positive except for 2000-01. A similar trend is also visualized for Rajasthan. There was unprecedented rise of over 570 percent in 1980-81 but in subsequent periods it was uneven and settled at was negative of 10 percent in 2017-18.

**Table 1.3: Growth rate of Production of Rape/Mustard in the World, India and Rajasthan**

Year	World	Growth Rate	India	Growth Rate	Rajasthan	Growth Rate
1980-81	12726822	-	2304300	-	248454	-
1990-91	28231000	121.82	5229300	126.94	1669253	571.86
2000-01	36373768	28.84	4187200	-19.93	1302809	-21.95
2010-11	63378309	74.24	8179000	95.33	3883283	198.07
2017-18	75711806	19.46	8430000	3.07	3524117	-9.25

Source – Agriculture Statistics of Rajasthan, Column of Growth Rate Calculated by Researcher

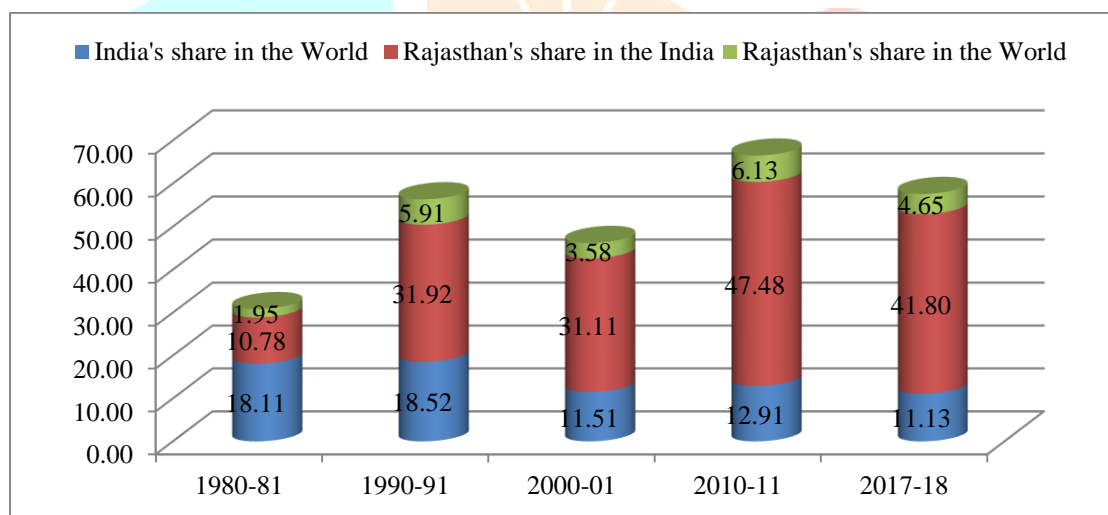
Table 1.4 shows percentage share in rapeseed-mustard production of India and Rajasthan in the world. India's share in rapeseed-mustard production in world has been falling continuously over the period from 18 percent in 1980-81 to 11.5 percent in 2000-01 and to 11 percent in 2017-18. Rajasthan's share in All-India rapeseed-mustard production has consistently shown a rising trend from 11 percent in 1980-81 to 47.5 percent in 2010-11, albeit it has reduced to 42 percent in 2017-18. In 2010-11 Rajasthan produced 6.1 percent of total world production of rapeseed-mustard.

**Table 1.4: Share of Production of Rape & Mustard in the World, India and Rajasthan**

Year	India's share in the World	Rajasthan's share in the India	Rajasthan's share in the World
<b>1980-81</b>	18.11	10.78	1.95
<b>1990-91</b>	18.52	31.92	5.91
<b>2000-01</b>	11.51	31.11	3.58
<b>2010-11</b>	12.91	47.48	6.13
<b>2017-18</b>	11.13	41.80	4.65

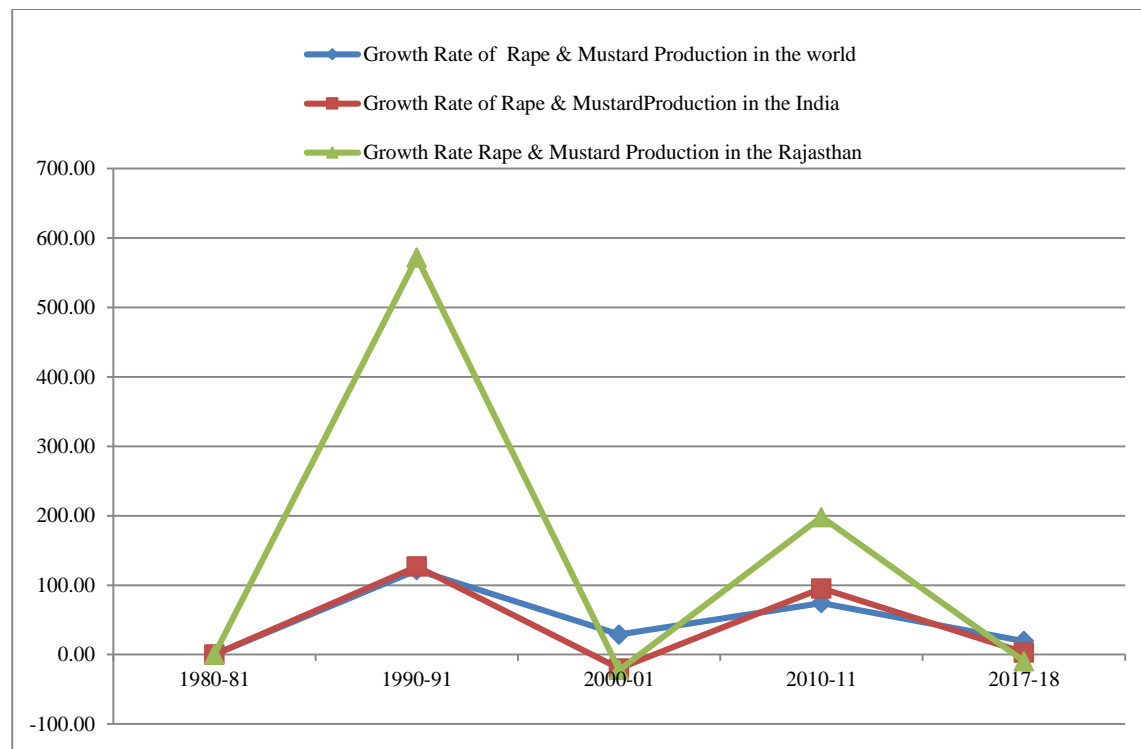
Source - Calculated by Researcher from Table 1.3

Figure 1(c) is based on the data given in Table 1.4 which are converted into suitable divided bars diagram. The blue bars represent India's shares in production of rapeseed-mustard in the world which are contracting meaning thereby its share is falling, while that of Rajasthan bars are expanding means its share in India as well as in the world is rising. Rajasthan is important producer of rapeseed/mustard in not only India but in the world as well.

**Figure 1(c): Share of Production of Rape/Mustard in the World, India and Rajasthan**

Source – Table 1.4

Figure 1(c) is drawn from Table 1.4 and constructs multiple graph lines of different colors. The blue and red graph lines show growth pattern of rapeseed-mustard production in world and India respectively. Both graph lines are trekking in tandem, albeit, world rates kept higher level except 2010-11. Rajasthan growth rate shows highly unstable and fluctuating behavior. There was spectacular growth in rapeseed-mustard output in Rajasthan in 1990-91 but a trough in 2000-01 but recovered thereafter.

**Figure 1(d): Growth Rate of Rape & Mustard Production in the World, India and Rajasthan**

Source – Table 1.4

#### Yield of Rapeseed/Mustard-

Table 1.5 shows the growth rates of yield of rapeseed-mustard for the world, India, and Rajasthan. The world growth rates have been falling throughout the period from 1980-81 to 2017-18 except in 2010-11. It was 35 percent in 1990-91 fell to 17.44 percent in 2010-11 and then to 7.37 percent in 2017-18. A very similar trend in India's growth rate of rapeseed-mustard yields was observed. In 1990-91 it was 61.4 percent fell down to 3.4 percent in 2000-01 but significant recovery was made in 2010-11 when the rate was 34.4 percent. The tempo could not be maintained and in 2017-18 the growth rate came down to below one percent. Exactly same trend is observed for Rajasthan. Barring 2010-11 when growth rate was 68 percent the rates were falling continuously from 27 percent in 1990-91 to 7 percent in 2000-01 and then to 3.5 percent in 2017-18.

**Table 1.5: Growth rate of Yield of Rape/Mustard in the World, India and Rajasthan**

Year	World	Growth Rate	India	Growth Rate	Rajasthan	Growth Rate
<b>1980-81</b>	1036	-	560	-	685	-
<b>1990-91</b>	1395	34.65	904	61.43	870	27.01
<b>2000-01</b>	1583	13.48	935	3.43	929	6.78
<b>2010-11</b>	1859	17.44	1257	34.44	1560	67.92
<b>2017-18</b>	1996	7.37	1258	0.08	1614	3.46

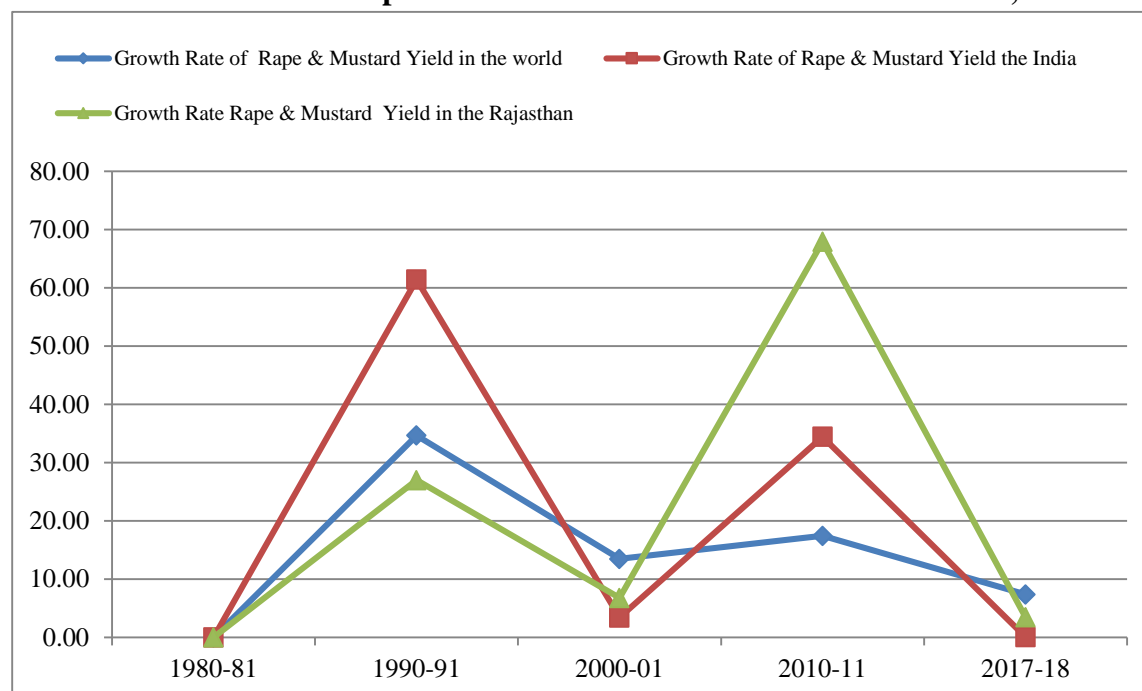
Source – Agriculture Statistics of Rajasthan, Column of Growth Rate Calculated by Researcher

Figure 1(e) is constructed using data from Table 1.7. The graph lines showing the growth rates of rapeseed-mustard yields for world, India, and Rajasthan all lines show a similar pattern. Reaching first peak in 1990-91 and the second, a

still higher, peak was observed in 2010-11. The significant decline was obtained in 2000-01. The growth rates were higher for India (red line) between 1880-81 and 2000-01. From 2000-01 onwards Rajasthan's (gray line) growth rates were higher than those for India and the world.

**Figure 1(e)**

### Growth Rate of Rapeseed/Mustard Yield in the World, India and Rajasthan



**Source – Table 1.5**

#### Conclusion:

Rapeseed-mustard is important oilseed crop world over and India is a very prominent producer. It has multipurpose uses. Besides providing edible oil for human consumption, it is used as animal feed and biodiesel. India ranks third after China and Canada in terms of area coverage (18.93 percent) and production (11.6 percent). The average yield of the crop is one-third less in India (1128 kg/ha) as compared to the world average (1840 kg/ha) while Germany and France have three times higher productivity compared to India. A large number of factors are responsible for very low yield rates in the country, which include technological and institutional. Lack of adequate and proper irrigation is the critical factor amongst others.

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