Chapter 9

Conclusions and Suggestions

The agricultural productivity and production was quite small during the Pre-Independence period and the state was facing acute shortage of food grains. The proportion of net sown area was relatively small, while the percentage of cultivable wastelands, fallow lands and other cultivable land was relatively high. Some agricultural land was under permanent pastures and grazing lands. This was the time of food crisis in the state. With the implementation of First Five Year Plan some cultivable wasteland, fallow land and other cultivable land has been reclaimed and therefore the net sown area has increased during 1956-71. During the year 1956 to 1971, an overall development in agriculture was remarkable and the state has become one of the surplus producers of food grains.

During last five decades the remarkable changes in the land use pattern have been recorded in Madhya Pradesh. The net sown area was 100.9 lakh hectares in 1950-51 which has increased to 138.7 lakh hectares in 1970-71; it was an increase of 37.5 per cent. Between 1971 and 1991, about 7.35 per cent increase has been recorded in the net sown area, from 138.7 lakh hectares in 1970-71 to 148.9 lakh hectares in 1990-91. About 48 per cent increase has also been recorded in the net sown area during the period. Consequently, an increase of 77.5 per cent has been recorded in the total cropped area. On the other hand, proportion
of cultivable waste lands, old fallows, areas under permanent pastures and other grazing land has been reduced nearly 60 per cent, from 87 lakh hectares to 33 lakh hectares during last fifty years. This is because of horizontal expansion in the agriculture through the development of irrigation facilities and mechanization. In the state 35.6 lakh hectares area is under double cropping, which is equivalent to the total geographical area of Haryana state. About five times increase in the double cropped area has been recorded during last half century, from 7.1 lakh hectares in 1950-51 to 35.6 lakh hectares in 2002-03. The food grains have occupied major part nearly two-third in the total cropped area, more than one-fourth under oilseeds, and the remaining gross cropped area was under other crops in the year 2002-03. The area under food grains has increased by 29.6 per cent between 1956-57 and 1970-71, from 99 lakh hectares to 129.5 lakh hectares.

Moreover, during 1971 to 1991 the rate of growth was slow down when comparison made with the previous decades. Since land has certain limits to increase the agricultural production in a given socio-economic scenario, therefore agricultural production cannot increase indefinitely. This fact has been proved in the next decade, when the production was either stable or decreasing in this state. Not only the production but the productivity has also been stabilised or decreasing now in the state.

Since 1991 instead of increase in the production of food grains it has recorded fluctuations in the next ten years. About 1.81 per cent decrease has recorded in net sown area from 148.9 lakh hectares in 1990-91 to 146.2 lakh hectares in 2002-03. The area under fallow and cultivable wastelands has been reclaimed to its maximum possible limit. In recent years, a decrease of 1.7 lakh hectares (1.17%) in net sown area has been recorded in the state between 1998-99 and 2002-03. This is due to an increase in fallow lands, from 1.04 million hectares (1998-99) to 16.2
lakh hectares (2002-03). About 61.5 per cent increase in the fallow land has been recorded during last five years.

After 1991, this declining trend in growth rate is because of failure of monsoon in many years. The state was under draught condition in the year 2000-2001, when 32 districts out of 45 were affected by this natural calamity. The year 2002-03 has also known as draught year when 33 districts out of 45 were affected by draught condition.

Changes in Land use Pattern

The total geographical area of new Madhya Pradesh is 307.6 lakh hectares in the year 2002-03, which is 9.4 per cent of the country's total geographical area. More than one-fourth (27.9 %) area is under forests, less than half (47.54%) of the total geographical area is under cultivation and the remaining one-fourth is under various agricultural and non-agricultural uses.

During last five decades the highest increase (80.06%) has been recorded in the double cropped area, from 11.1 lakh hectares (1956-57) to 35.6 lakh hectares (2002-03). Similarly, the net sown area has also recorded significant increase in from 113.2 lakh hectares to 146.21 lakh hectares (47.54%), suggesting an increase of 29.16 per cent during the period. Therefore, the total cropped area has increased from 126.7 lakh hectares to 181.8 lakh hectares, suggesting an increase of 43.5 per cent. On the other hand, the proportion of other uncultivated land, cultivable waste land, and old fallow land has been reduced from 86.08 lakh hectares to 32.34 lakh hectares during last five decades.

Nearly one-fourth (24.7%) of the geographical area of the state is under forests (76 lakh hectares) which is nearly ten per cent of the total forested area of the country. The area under forest ranges from 0.52 per cent in Ujjain district to 61.4 per cent in Mandla district. Ujjain
district has recorded lowest area under the forest and therefore highest net sown area (79.5%).

The area under forest has recorded 7.07 per cent increase between 1956-57 and 2002-03, from 70.98 lakh hectares in 1956-57 to 76 lakh hectares in the year 2002-03. About 49 per cent districts of the state have recorded higher area under forests and the remaining 51 per cent have recorded lower area under forest in comparison to State's average of 24.7 per cent.

Nearly one-tenth (10.76%) of the geographical area (33.07 lakh hectares) of the state is classified as not available for cultivation. It has reduced by 16.29 per cent, from 39.51 lakh hectares (13.1%) in 1956-57 to 33.07 lakh hectares (10.76%) in the year 2002-03. This land ranges from 3.85 per cent in Chhatarpur district to 26.5 per cent in Morena district. About 47 per cent districts of the state have recorded higher proportion of area not available for cultivation, while the remaining 53 per cent districts have recorded low and very low proportion of land not available for cultivation.

The other uncultivable land is 14.14 lakh hectares which is 4.59 per cent of the total geographical area of the state. The proportion of other uncultivable land has ranges from 0.7 per cent of the total geographical area in Barwani district to 11.79 per cent in Rajgarh district.

The cultivable waste land was 12.13 lakh hectares which is 3.95 per cent of the total geographical area of the state in the year 2002-03. In other words, out of the total cultivable wastelands 5.45 lakh hectares (1.77) can be brought under cultivation immediately, 3.32 lakh hectares (1.08%) can brought under cultivation after some improvement and 3.37 lakh hectares (1.09%) is uneconomic land and cannot brought under cultivation. Thus, about 8.77 lakh hectares (2.17%) cultivable wasteland can be brought under cultivation after some improvement in the state.
During the year 1956-57 the cultivable wasteland (including other uncultivated land and old fallow land) was 86.8 lakh hectares which was more than one-fourth (28.7%) of the total geographical area of the state. It has declined to 32.53 lakh hectares, which is 10.58 per cent of the total geographical area (2002-03).

About 16.22 lakh hectare area is under fallow land which is 5.27 per cent of the total geographical area of the state in the year 2002-03. The fallow land ranges from 0.29 per cent in Dewas district to 18.81 per cent in Dindori district. The proportion of current fallow land (9.97 lakh hectares, 3.24%) is higher than that of the old fallow lands (6.26 lakh hectares, 2.03%) in the state. The current fallow land has decreased by 21.5 per cent, from 12.7 lakh hectares (1956-57) to 9.97 lakh hectares (2002-03). The old fallow land has decreased by 2.19 per cent from 6.4 lakh hectares (1968-69) to 6.26 lakh hectares (2002-03).

Less than half of the geographical area (47.54%) of Madhya Pradesh is under cultivation (NSA) which is slightly higher (0.94%) that that of the national average of 46.6 per cent. The net sown area increased by 29.16 per cent during last five decades, from 113.2 lakh hectares (37.5%) in 1956-57 to 146.21 lakh hectares (47.54%) in the year 2002-03.

In recent years, a decrease of about 5 lakh hectares (3.36%) in net sown area has been recorded in the state, between 1998-99 and 2002-03. This is due to an increase in fallow lands, from 11.75 lakh hectares (1998-99) to 12.13 lakh hectares (2002-03). About 3.23 per cent increase in the fallow land has been recorded during last five years. The present trend in the state is the result of the failure of Monsoon rains and shortage of water for agriculture. The state is facing a problem of water shortage which has an impact on the agriculture.

About 35.6 lakh hectares (24.35 % of NSA) area is under double cropping. More than 32 times increase in the double cropped area has been recorded during last forty-five years, from 1.11 lakh hectares in 1956-57 (9.8 % of NSA) to 35.6 lakh hectares (24.35 %) in 2002-03.
The gross cropped area in the state has increased by 43.5 per cent during last five decades, from 126.7 lakh hectares to 181.81 lakh hectares in the year 2002-03. The highest gross cropped area is recorded by Harda district (122.2 %) of the Narmada valley and the lowest gross cropped area is recorded by Sheopur district (22.7 %) in the northern part of the state.

Number and Size of Land Holdings

Number of Land Holdings: The number of operational holdings in this state was more than 66.37 thousand, and the average size of operational holdings was about 2.5 hectares in the year 1995-96 in New Madhya Pradesh.

The highest number of holdings is of 1 to 2 hectares (25.2 %), and lowest are of above 20 hectares (0.5 %), while the highest area of holdings is of 5 to 10 hectares (25.6 %), and lowest is of below 0.5 hectares (1.9 %). Therefore, as per the number of holdings the common size of holding is of 1 to 2 hectares, while as per the area of holdings the common size of holding is of 5 to 10 hectares.

Three-fourth (75 %) of the total holdings is of less than 3 hectares and these holdings have more than one-third (34.7 %) of the total area of the state. Moreover, more than one-third (36.2 %) are of less than one hectare of land and comprise 6.8 per cent of total area. Less than two-third (61.4 %) of total holdings are of below two hectares in size comprising 21.5 per cent of area.

On the other hand, only 2.05 per cent of holdings are of largest in size (more than 10 hectares), which have occupied about 19.9 per cent (3294 thousand hectares) area and about 3.1 per cent (1050 thousand) of the total holdings.
Change in the number of Holdings: The number of all the holdings has recorded 73.4 per cent increase in the state during 1970-71 to 1995-96, from 3837 thousand to 6637 thousand. The large size holdings are converting into marginal and small size of land holdings and therefore the number of holdings is increasing continuously. The highest increase in the number of holdings has recorded by marginal and small size of holdings. The very small size of holdings (1 to 2 hectares) has recorded 167 per cent increase from 627 thousand (1970-71) to 1672 thousand (1995-96), in the state. The higher increase has recorded by the small size of holdings (2 to 3 hectares), i.e. 97.8 per cent from 457 thousand (1970-71) to 904 thousand (1995-96), in the state.

While the semi-medium (3 to 4 hectares) size of holdings has recorded 54.5 per cent change in the state during 1970-71 to 1995-96, from 330 thousand to 510 thousand. The medium (4 to 5 hectares) size of holdings has recorded 29.2 per cent change in the state during 1970-71 to 1995-96, from 267 thousand to 345 thousand.

The number of large size of holdings has recorded negative change in the state during 1970-71 to 1995-96. The highest decrease in the number of holdings has recorded by large size of holdings and the lowest decrease in the number of holdings has recorded by the medium size of holdings. Similarly, the very high decrease has recorded by 10 to 20 hectares size, i.e. 44.7 per cent from 309 thousand (1970-71) to 171 thousand (1995-96). The number of large size of holdings (above 20 hectares) has recorded a decreasing trend in the state during last three decades. It is evident from the facts that the number of these holdings has decreased by 62.6 per cent, from 91 thousand in 1970-71 to 34 thousand in 1995-96.

Area of Land Holdings: The area of these holdings has recorded only 1.59 per cent increase in the state during 1970-71 to 1995-96, from 16319 thousand hectares to 16578 thousand hectares.
The highest increase in the area of holdings has recorded by marginal and very small size of holdings. The similar increase has recorded by marginal size of holdings (below 0.5 hectare) i.e. 120 per cent from 145 thousand hectares (1970-71) to 345 thousand hectares (1995-96) in the state.

A moderate increase has also recorded by small size of holdings (2 to 3 hectares) i.e. 93.3 per cent from 1132 thousand hectares (1970-71) to 2188 thousand hectares (1995-96). Relatively, lower increase has recorded by medium size of holdings (4 to 5 hectares) i.e. 27.9 per cent from 1196 thousand hectares (1970-71) to 1530 thousand hectares (1995-96).

On the other hand, area under medium, large and very large size of holdings has recorded negative change in the state during 1970-71 to 1995-96. The highest decrease in the area under holdings has recorded by very large size of holdings and the lowest decrease in the number of holdings has recorded by the medium size of holdings. Similarly, the very high decrease in area has also recorded in the large size of holdings (10 to 20 hectares), i.e. 44.8 per cent from 4158 thousand hectares (1970-71) to 2297 thousand hectares (1995-96). While the area under medium size of holdings (5 to 10 hectares) has recorded about 5.43 per cent decrease during 1970-71 to 1995-96, from 4490 thousand hectares to 4246 thousand hectares.

The area of large size of holdings (above 20 hectares) has recorded a decreasing trend in the state during last three decades. It is evident from the facts that the area under these holdings has decreased by 64.7 per cent, from 2822 thousand in 1970-71 to 993 thousand in 1995-96.
Changes in Cropping Pattern

Most of the gross cropped area is devoted to the food grains and oilseeds, about two-third (62.7%) of the total cropped area of the state is under food grains; more than one-fourth (28.3%) under oilseeds, and the remaining 9.1 per cent gross cropped area was under other crops in the year 2002-03. Out of the total food grains, 63.7 per cent area was under cereals and 36.3 per cent area was under pulses during the year. About 44.4 per cent of the food grains and 27.9 per cent of the total cropped area of the state have occupied by two main cereals, i.e. wheat and rice. Among the pulses, gram has occupied 59.7 per cent of the total area under pulses, 21.7 per cent of the total area under food grains and 13.6 per cent of the total cropped area. More than one-third (37.3 %) of the total cropped area was under oilseeds and other non-food crops in this state.

A little change in the area under food grains has been recorded in the state during last five decades. The area under food grains has increased by 29.6 per cent between 1956-57 and 1970-71, from 9.9 lakh hectares to 12.95 lakh hectares. Since then either it is stable or decreasing. But, during last three decades, a significant shift in cropping pattern has been recorded in the state. The proportion of gross cropped area under food grains has decreased by 22.9 per cent, from 85.6 per cent of the gross cropped area (1970-71) to 62.7 per cent of the gross cropped area (2002-03). The absolute area under food grains has also been decreased by about 12 per cent, from 129.53 lakh hectares to 113.93 lakh hectares during the period.

The proportion of gross cropped area under cereals has decreased by 18.3 per cent, from 58.2 per cent of the gross cropped area (1970-71) to 39.9 per cent of the gross cropped area (2002-03). The absolute area under cereals has also been decreased by about 17.6 per
cent during the period, from 88.1 lakh hectares in 1970-71 to 72.6 lakh hectares in 2002-03.

On the other hand, the area under pulses has increased by about 2 per cent, from 20.8 % of TCA in the year 1970-71 to 22.74 % of TCA) during in the year 2002-03. The absolute area under pulses has been increased by 31.6 per cent, from 31.43 lakh hectares to 41.36 lakh hectares during the period. Similarly, the area and percentage of gross cropped area under oilseeds has been increased during last forty-five years, from 12.02 lakh hectares (9.49% of TCA) to 51.5 million hectares (28.3% of TCA) during the year 1956-57 to 2002-03. The proportion of some other cash crops has also increased in the state.

Among food grains, cereals have occupied major part of the total area. The main cereals in the state are wheat, rice, maize, jowar, bajra and barley. These six cereals have about 60 per cent of the total food grains and nearly 38 per cent of total cropped area. Wheat is the first important crop in terms of area in the state. Now, rice is the second important crop in terms of area in the state. Gram has first position among all the pulses in the state. The area under vegetables and fruits was 1.1 per cent of the total cropped area of the state in the year 2002-03. The area under vegetables and fruits has registered an increasing trend since 1970-71. Area under vegetables and fruits has recorded 2.7 times increase during last thirty years, from 79 thousand hectares in 1970-71 to 192 thousand hectares in the year 2002-03.

**Agricultural Inputs**

*Trends in Irrigation*: The gross irrigated area was 46.31 lakh hectares in the state which was about one-fourth (25.47%) of the total cropped area (TCA) in the year 2002-03; while the net irrigated area was 44.94 lakh hectares which was about 30.7% of the net sown area (NSA)
in the state during the year. The proportion of the gross irrigated area has ranges from 0.61 per cent in Dindori district in the east to 61 per cent in Gwalior district in the north.

Wells have recorded first rank among all the sources of irrigation with its proportion of 41.9 per cent in 2002-2003. Tubewells have recorded second position with its proportion of 24.5 per cent in the year. Canals have recorded third position with 16.94 per cent while tanks and various other sources have fourth position with 16.61 per cent.

Among the various crops wheat has recorded first rank with 5.652 per cent of the total irrigated area and gram has second position with 23.08 per cent. These two crops viz. wheat and gram have occupied three-fourth (75.8 %) of the total irrigated area of the state (2002-03). About 92 per cent of the total irrigated area of the state is under food crops and nearly 8 per cent is under non-food crops.

About nine times increase in the gross irrigated area has registered in the state during last forty-five years, from 5.2 lakh hectares (4.11 %) in 1956-57 to 46.31 lakh hectares (25.47 %) in 2002-03 (Table 6.2). The highest increase has recorded by Vidisha district (66 times) in the central part of the state and the lowest recorded by Balaghat district (32.3 %) in the east during the period.

Five districts have recorded more than 25 times increase in the gross irrigated area during 1970-71 to 2002-03. Four districts of the State have recorded more than 10 times increase in the gross irrigated area during the period. About 5 to 10 times increase has recorded by 15 districts, they are 33 per cent of the state, while 18 districts (44 %) have recorded relatively lower increase in the irrigated area (less than 5 times). The remaining 2 districts have recorded very low increase in the irrigated area (less than 100 %).

Among the source wise irrigation, wells have recorded nearly six times increase, canals have recorded more than five times
increase, and other sources have recorded about 33 times increase during the period 1956-57 and 2002-03.

Among the crop wise irrigated area, food grains have recorded more than 8 times increase in gross cropped area during the period. Pulses have recorded more than 24 times increase, while cereals have recorded 6.4 times increase in the state during the period. Among the crops gram has recorded more than 26 times increase in gross irrigated area in the state, followed by wheat (15 times).

It has been realized that irrigation is very important for the development of agriculture in this state, therefore various irrigation potentials created by the Government during the Plan and pre-Plan schemes, but little have been utilised. During 1990-91 the irrigation potentials created 29.1 lakh hectares but only 18.2 lakh hectares had been utilised by the cultivators. This proportion further decreased in the successive years. During 2002-03 total potential created in 22.1 lakh hectares and only 10.7 lakh hectares have been utilised by the cultivators in the state, which is less than half of the total created potentials.

Trends in fertilizer's use: The consumption of fertilizers was 7.04 lakh tonnes in the year 2002-03; it was 39.2 kg/hectare. It has recorded more than seven times increase between 1971 and 2002, from 5.29 kg/hectare (1971-72) to 39.2 kg/hectare (2002-03). Per unit consumption of fertilizers was almost negligible (0.88 kg/ha) in the year 1956-57; while it was highest (48.4 kg/ha) in the year 1998-99.

The consumption of fertilizers is higher in rabi season than in kharif season. In kharif season the consumption of fertilizers was 24.7 kg/hectare and it was 61.9 kg/hectare in rabi season in the year 200-03. In kharif season, about 2.6 times increase in consumption of fertilizers has been recorded, from 2.72 lakh tonnes in 1971-72 to 7.04 lakh tonnes in the year 200-03; while in rabi season more than eight times increase
has been recorded during the period, from 54.9 thousand tonnes (1971-72) to 4.46 lakh tonnes (2002-03).

The consumption of fertilizers in *kharif* season ranges from 2.63 kg/hectare in Shahdol district to 139.7 kg/hectare in Gwalior district. During *kharif* season six districts of Malwa plateau and four districts of Madhya Bharat plateau have recorded very high consumption of fertilizers (above 66 kg/ hectare). While, during *rabi* season consumption of fertilizers ranges from 0.62 kg/hectare in Dindori district to 274 kg/hectare in Khargone district.

*High Yielding Varieties of Seeds:* During the year 2003-04, the area under the high yielding varieties of seeds was 54.4 lakh hectares, which was 29.9 per cent of the gross cropped area. Earlier, in the year 1970-71 area under the high yielding varieties of seeds was only 3.33 lakh hectares, suggesting an increase of about 9 times during 1970-71 to 2003-04. Out of the total area under the high yielding varieties of seeds 60.6 per cent has been occupied by wheat only and the remaining 39.4 per cent by four other crops.

At district level, the area under the high yielding varieties of seeds ranges from 12.9 thousand hectares in Datia district (6.17 % of GCA) to 230.3 thousand hectares in Chhindwara district (37.4 % of GCA). The highest area under the high yielding varieties of seeds has recorded by Balaghat district (64.9 % of GCA). Some other districts with higher area under the high yielding varieties of seeds are Gwalior, Hoshangabad and Rewa.

In terms of crop wise area under the high yielding varieties of seeds, the highest increase has been recorded by maize (33 times), from 17.2 thousand hectares (1970-71) to 573.7 thousand hectares (2003-04). Paddy has recorded 22 times increase, from 46.7 thousand hectares to 1044 thousand hectares and wheat has recorded 16 times increase, from 2.05 lakh hectares to 32.9 lakh hectares during the period. Jowar
has recorded 7 times increase and bajra has recorded 4 times increase during the period in the state.

Out of the total area under the high yielding varieties of seeds 60.6 per cent has been occupied by wheat only and the remaining 39.4 per cent by four other crops. Paddy has second rank with 19.2 per cent and maize has third position with 10.5 per cent of the total area under the high yielding varieties of seeds in Madhya Pradesh. Jowar (7.5 %) and bajra (0.7 %) has relatively low area under the high yielding varieties of seeds.

Mechanisation in Agriculture: There are 2.18 lakh tractors used in agriculture in the state and per tractor gross cropped area is about 67.5 hectares; number of diesel and electric pumps are about 13.77 lakh and per pump gross cropped area is about 10.62 hectares; number of iron and wooden plough are 73.45 lakh and per plough area is 1.99 hectare. The number of tractor is highest in Vidisha district and lowest in Dindori district.

Trends in Crop Production

The total production of major crops was about 176 lakh tonnes in the state during the year 2002-03. Out the total crops, food grains have occupied about 61.1 per cent (107.5 lakh tonnes), oilseeds 17.8 per cent (31.4 lakh tonnes), vegetables 11.6 per cent (20.5 lakh tonnes), fruits 6.3 per cent (11.1 lakh tonnes), cotton 2.2 per cent (3.9 lakh tonnes), and sugarcane 0.9 per cent (1.6 lakh tonnes) in the year 2002-03. Production of all the crops has recorded continuous increase during last five decades. Moreover, production of food grains has recorded about four times increase during last half century, from 27.7 lakh tonnes in the year 1950-51 to 107.5 lakh tonnes in the year 2002-03.

But, after 1999-2000, the production of food grains has registered a declining rout in the state. The highest production was
recorded in this year in the last century. Next year production has recorded 36.6 per cent decrease, from 160.6 lakh tonnes to 101.9 lakh tonnes. Moreover, cereals and pulses have also recorded the highest production in the year 1999-2000. Among cereals, wheat and rice have recorded highest production during the year. On the other hand, the production of jowar has registered a continuous decrease since 1990-91. The production of maize has decreased during the period 1992-93 to 1996-97 and then it has recorded an increasing trend in this state. Among pulses, production of gram was highest in the year 1999-2000.

The state was under drought condition during the years 1991-92, 1997-98, 1998-99, 2000-01, 2002-03 and 2004-05, when majority of the districts if the state were under either draught or hail storm. Consequently, the production from agriculture was relatively very low, during the draught years. During the year 1990-91 about 23 districts out of 45 were affected by draught condition. During the year 1997-98 about 35 districts were affected by excessive rains and hail storm. The similar condition was recorded in the year 1998-99 also. During the year 2000-2001 and 2002-03 about 33 districts were affected by draught condition.

In Madhya Pradesh, the compound growth rate in the production of food grains has recorded 2.35 per cent during last thirty years (1970-71 to 2003-04). Among all the crops, the highest growth rate has been recorded by soyabean (12.5 %), followed by mustard (7.5 %) during 1970-71 to 2003-04. Among the food grains, the highest growth rate has been recorded by maize (4.02 %) and followed by gram (3.7 %). The very high growth rate has recorded by wheat (3.23 %) and followed by bajra (2.39 %), while the lower growth rate has been recorded by rice (1.74 %). The increase in the food grains reflects the combined effects of increase in area and yield per hectare.

Cereals have recorded 1.76 per cent growth rate and pulses have recorded 2.22 per cent growth rate during the period 1970-71 to 2003-04. Moreover, among food grains very high growth rate has
recorded by maize (4 %) and gram (3.3 %). Wheat has recorded 2.6 per cent growth rate, rice (1.8 %) and bajra (1.8 %) have recorded relatively moderate growth rate, while jowar has recorded negative growth rate (-2.6 %) during the period.

Moreover, during the period 1990-91 to 2003-04, soybean has recorded very high growth (6.1 %) in production. Bajra and maize have recorded higher growth rate in the production i.e. 4.28 and 3.91 per cent respectively. On the other hand, jowar and mustard have recorded negative growth rate i.e. 2.84 and 0.17 per cent, respectively, during the period.

The food grains contribute about two-third (61.08 %) of the major crops, in the state. Among the food grains, cereals contribute more than three-fourth (77.9 %) and pulses contribute about one-fourth (22.11 %) in the state. The main food grains are wheat, rice, maize, jowar, gram and tur. Madhya Pradesh has about 6.2 per cent share in the country in the production of food grains, with its production of 107.5 lakh tonnes. The production of the food grains is increasing continuously in the state since 1956. Wheat ranks first in terms of production which is also the main crop of Madhya Pradesh. Gram comes second in terms of production, maize is on the third position and rice is now on the fourth position. Other important food grains are jowar, barley and tur in terms of production.

The main producers of food grains are the Madhya Bharat plateau and the Bundelkhand uplands in the north; the Rewa plateau and Singrauli basin in the eastern part; the Narmada valley in the central part; the Satpura region in the south; the Malwa plateau and the Nimar uplands in the western part of the state. While six districts of the Malwa plateau, and six eastern districts of the state have recorded relatively low production of food grains.

Among the oilseeds soybean, groundnut, mustard, and sesasum are important in terms of production. The production of
oilseeds was 31.44 lakh tonnes in the year 2002-03, and it has recorded continuous increase since last fifty years. About six times increase has been recorded during last three decades, from 5.3 lakh tonnes in the year 1970-71 to 31.44 lakh tonnes in the year 2002-03. Nearly three-fourth of total oilseeds production is contributed by groundnuts and soybeans only.

The production of total vegetables was 20.5 lakh tonnes in the year 2002-03. Production of vegetables has recorded about 23.5 per cent increase during last two decades, from 16.61 lakh tonnes in the year 1982-83 to 20.5 lakh tonnes in the year 2002-03. Production of vegetables has recorded increasing trend up to the year 1998-99, when it was 33.24 lakh tonnes. But after 1998-99 the production has decreased by 38.3 per cent, from 33.24 lakh tonnes (1998-99) to 20.5 million tonnes in the year 2002-03. This decreased was due to scarcity of water in the state during last three years. The district wise data are available for some vegetables such as potatoes, tomatoes, cabbage, cauliflower, peas, etc.

The production of total fruits in Madhya Pradesh was 11.13 lakh tonnes in the year 2002-03, which was about ten per cent of the total fruits production of the country. The total banana production was 6.54 lakh tonnes in the year 2002-03, which was 58.8 per cent of the total fruits production of the state. The main districts of banana are Khandwa, Khargone, Dhar and Rajgarh districts.

The total production of sugar and gur was 1.56 lakh tonnes in the year 2002-03, which was only one per cent of the total sugar and gur production of the country. The trends in the production of sugar and gur has recorded some fluctuations and finally no change during last forty-five years, from 156 thousand tonnes in the year 1956-57 to 1.56 thousand tonnes in the year 2002-03. The average productivity of sugar and gur was 3991 kg per hectare in this year.
Agricultural productivity

The production of food grains has recorded about four times increase during last half century, from 27.7 lakh tonnes in the year 1950-51 to 107.5 lakh tonnes in the year 2002-03. This increase is due to both horizontal expansion and the intensification in the agriculture during the period. When comparison made between 1970-71 and 2002-03, this growth was about two times, and since the year 1991 the area, production and productivity of food grains is almost stable. This state has occupied more than one-tenth (11.8 %) cultivated land under major crops and produce only 6.2 per cent of the country during the year 2002-03. The lower agricultural production is an indication of lower productivity. The average per unit productivity of food grains in the state is 944 kg/hectare, which is about 60 per cent of the country’s productivity of food grains 1562 kg/hectare.

Moreover, the state has occupied 7.9 per cent area of the cereals of the country and produce only 4.9 per cent of the country during the year 2002-03, this situation is because of lower productivity in the state.

The productivity of cereals in the state is 1154 kg/hectare and it is 1863 kg/hectare in the country. But, the productivity of pulses is relatively higher in the state i.e. 103.4 per cent of the country. The productivity of pulses in the state is 576 kg/hectare while it is 556 kg/hectare in the country. The state has occupied 20.6 per cent area of the pulses of the country and produce 21.3 per cent of the pulses of the country during the year 2002-03. Thus, it is therefore concluded that this state has occupied more cultivated area and produce less, because of lower productivity.

The yield rate of food grains has recorded 944 kg/hectare which is about 60 per cent lower than that of the average of the country
(1562 kg/hectare). It is 1154 kg/hectare for cereals, 575 kg/hectare for pulses and 611 kg/hectare for the oilseeds.

The yield rate of cereals is about 38 per cent lower than the average of the country (1863 kg/hectare) it is 3.4 per cent higher in the pulses and for oilseeds (611 kg/hectare) it is about 14 lower than the average of the country (710 kg/hectare).

The highest per unit productivity has been recorded by maize (1751 kg/hectare) followed by wheat (1520 kg/hectare) and barley (1257 kg/hectare). The per unit productivity of paddy is the lowest (646 kg/hectare), it is only 35.8 per cent of the average of the country (1804 kg/hectare). Among the pulses the highest per unit productivity has been recorded by gram (694 kg/hectare) and followed by tur (614 kg/hectare).

To assess the agricultural productivity the district wise average agricultural output has been worked out for nineteen crops. The average combined yield rate of these twenty crops was 833 kg/hectare during the year 2002-03; it ranges from 347 kg/hectare in Umaria district to 1154 kg/hectare in Hoshangabad district.

The yield rate of nineteen major crops has been taken for the analysis of agricultural productivity, by using the Kendall's method. The average productivity of food grains in the state is about 943 kg/hectare, it ranges from 436 kg/hectare in Damoh district to 1803 kg/hectare in Hoshangabad district during 2002-03.

The average productivity of food grains in the state has recorded 65.5 per cent increase during 1970-71 to 2002-03, from 570 kg/hectare to 943 kg/hectare. More than 91 per cent districts (41 districts) have recorded increase in the productivity, and the remaining 9 per cent districts (4 districts) have recorded decrease in the productivity during the period 1970-71 to 2002-03.

During 2002-03, out of the total districts, 26 districts (58 %) have recorded higher productivity than that of the average of the state
(943 kg/hectare). Moreover, two districts (Hoshangabad and Harda) have recorded extremely high productivity, i.e. 1803 kg/hectare and 1744 kg/hectare respectively. On the other hand, about 19 districts (42%) districts have recorded low and very low productivity when comparison made with the state’s average.

The index of productivity in the state is 60 per cent; it ranges from 46 per cent in Damoh district to 192 per cent in Hoshangabad district during the year. Out of the total districts, 37 districts (82%) have recorded higher index of productivity than that of the average of the state.

The index of productivity in the state has been increased in 21 districts (47%), while it has decreased in the remaining 24 districts (53%), during 1970-71 to 2002-03.

The average carrying capacity in terms of SNU is worked out to 385 units for the state for the year 2002-03; it ranges from 178 units in Damoh district to 735 units in Hoshangabad district. Three districts have very high carrying capacity of land (above 600 SNU); they are Hoshangabad, Harda and Gwalior plain. About one-fourth districts have recorded higher carrying capacity (between 500 to 600 SNU). Moreover, 42 per cent districts have recorded moderate carrying capacity of land. On the other hand, about 27 per cent districts have recorded low and very low carrying capacity.

**Suggestions**

1. *Increase in Net Sown Area*: During last fifty years, significant change has been recorded in the net sown area from 10.09 million hectares (33.4%) to 14.96 million hectares (48.63%) suggesting an increase of 48.26 per cent during the same period. This is because of horizontal expansion
in the agriculture through the development of irrigation facilities and mechanization.

The proportion of cultivable waste lands, old fallow land, area under permanent pastures and other grazing land has been reduced from 8.68 hectares to 3.32 million hectares during last fifty years.

Now, there is a little possibility of horizontal expansion of agriculture with the exiting socio-economic scenario of this state.

2. **Reduction in the Cultivable Wastelands**: In Madhya Pradesh, the cultivable waste land was 12.13 lakh hectares which is about 4 per cent of the total geographical area of the state in the year 2002-03. Out of the total cultivable wastelands 5.45 lakh hectares (1.8%) can be brought under cultivation immediately, 3.32 lakh hectares (1.1%) can brought under cultivation after some improvement and 3.37 lakh hectares (1.1%) is uneconomic and cannot brought under cultivation.

Thus, about 8.77 lakh hectares (2.9%) cultivable wasteland can be brought under cultivation after some improvement in near future in Madhya Pradesh.

3. **Decrease in the Fallow lands**: In Madhya Pradesh, 16.22 lakh hectares area is under fallow land which is 5.2 per cent of the total geographical area of the state. The percentage of current fallow land (9.96 lakh hectares, 3.2%) and old fallow lands (6.26 lakh hectares, 2.0%) is almost equal in the state.

The fallow land can be reduced to its minimum level by using agricultural inputs, particularly by the development of irrigation facilities, thus about 5.2 per cent net sown area can be increased in the state.

4. **Intensification in Cultivation**: In Madhya Pradesh 35.6 lakh hectares area is under double cropping (24.4 % of NSA). About six times increase
in the double cropped area has been recorded during last half century, from 7.1 lakh hectares in 1950-51 (2.35% of NSA) to 35.6 lakh hectares (24.4 %) in 2002-03. This increase in area sown more than once has been possible because of extension in irrigation facilities, use of fertilizers and high yielding varieties of seeds, and mechanization in agriculture.

Thus, about three-fourth of the net sown area (75.6 %) is under single cropping; therefore there is a large possibility of increase in the double cropped area in the state.

5. Change in the Cropping Pattern: In Madhya Pradesh, food cropped area has occupied nearly two-third (63.7%) of the total cropped area, more than one-third area (29.3%) is under oilseeds and other crops in the year 2002-03. The absolute area under food grains has decreased by 11.1 per cent, from 130.32 lakh hectares to 115.85 lakh hectares.

On the other hand, more than three times increase in the area under oilseeds has been recorded in the state, from 15.08 lakh hectares (9.96 %) to 51.45 lakh hectares (29.3 %). Thus, about one-third area (29.3%) is under non-food crops and it can be increase to some extent by changing the existing cropping pattern. This can increase the economic prosperity of the cultivators of the state.

6. Development in Irrigation: More than nine times increase in irrigated area has recorded by Madhya Pradesh during last forty-five years, from 5.2 lakh hectares (4.11%) in 1956-57 to 46.31 lakh hectares (25.5%) in 2002-03. Consequently about four times increase in double cropped area, three times decrease has been recorded in cultivable wasteland, old fallow land, permanent pastures and grazing land in the state. The development of the irrigation facilities has also changed the cropping pattern.
Thus, only one-fourth (25.5 %) of the gross cropped area is under irrigation in the state. Therefore, there is a large possibility of increase in the irrigated area in the state.

7. Increase in the use of Fertilizers: The consumption of fertilizers is 39.2 kg/hectare in the year 2002-03, which is less than half of the average of the country i.e. 84.8 kg/hectare. Though, it has recorded more than seven times increase between 1971 and 2002, from 5.29 kg/hectare to 39.2 kg/hectare.

The increase in the use of fertilizers per unit area will increase both the agricultural productivity and production. At least it can increase up to the national average i.e. 84.8 kg/hectare.

8. Increase in Area under High Yielding Varieties of seeds: The area under high yielding varieties of seeds was 54.4 lakh hectares in the year 2002-03, which is 29.9 per cent of the gross cropped area. Earlier, in the year 1970-71 this area was only 3.33 lakh hectares, suggesting an increase of more than 16 times during the period.

Thus, little more than one-fourth (29.9 %) of the gross cropped area is under high yielding varieties of seeds in the state. Therefore, there is a large possibility of increase in the area under high yielding varieties of seeds in the state.

9. Progress in Mechanization: Mechanization in agriculture helps in increasing per hectare productivity and reducing the fallow land and other uncultivated land. The situation of mechanization in Madhya Pradesh is not satisfactory when comparison made with the country. There are 2.03 lakh tractors, used in agriculture, in the state and per tractor gross cropped area is about 94.3 hectares; number of diesel and electric pumps are about 1.31 million and per pump gross cropped area is about 14.59 hectares; number of iron and wooden plough are 3.78 million and per plough area is 2.88 hectare.