Chapter - VIII
Conclusions, Problems and Suggestions

8.1 Introduction.
8.2 Conclusions.
8.3 Agricultural Problems of Vidarbha Region.
8.4 Suggestions.
Chapter - VIII

Conclusions, Problems and Suggestions.

8.1. Introduction:

In seventh chapter some important aspects of selected villages viz. irrigation, livestock, agricultural implements, general landuse, agricultural landuse, problems facing by selected villages, agricultural development regions have been analysed in detail.

The purpose of this chapter is to sumup main conclusions of the study (presented in the previous second to seventh chapter region to get comprehensive view regarding the agricultural geography of Vidarbha region. On the basis of these conclusions, an attempt is also made to discuss the agricultural problems of the study region. Suitable suggestions are also made in this chapter to change the existing situation and there by to achieve agricultural development in the study region.

8.2 Conclusions:

The following conclusions are drawn from the second to seventh chapters.

1) It is the biggest administrative division in the state. It covers about 31.66% area of the state. There are 119 tahsils and 13512 inhabited villages in the study region. Nearly 2365 villages are deserted villages. There is variation in all villages and tahsils regarding soils, climate and natural vegetation.

2) A major part of the region is occupied by plateau and alluvial plains while the rest of the area is mostly rocky, hilly and rugged. The general elevation of the region is from 150 to 1050. metres above mean sea level. The northern and eastern part of the region is not useful for agricultural development due to higher elevation. Particularly Gawilgarh hills, Arvi upland and Ramtek upland are not suitable for agriculture.
There is wide scope for the development of agriculture in Nagpur plain, Upper Wardha plain, Lower Wardha plain, Wardha-Wainganga divide, Upper Wainganga plain, Lower Wainganga plain and Pranhita-Godavari-Indravati loop. All these river basins are having favourable geographical environment for the extent cropping pattern.

3) The varied geology of the region shows equally varying geo-hydrological conditions. The ground water therefore exists under both water table and confined conditions. The prominent aquifers of the region are alluvium, weathered section of schists, gneisses, granite and highly jointed or sheeted zones in the traps. The ground water position on the plateau south of Buldhana ghat irregular and also difficult to exploit.

4) The climate is tropical monsoon type. The annual rainfall varies from 750 to 1450 mm distributed over 60 to 70 days. From middle of June to ends of August is the period of heavy rainfall. In the month of September rains are occasional few showers associates with cyclonic storms are also received during January and February. The mean annual air temperature varies from 25 °C to 27 °C. High temperature of 45 °C or more are witnessed during May. Lower rainfall zone with rainfall between 750 and 900 mm located in western and south western parts hence this region is lagging behind in agricultural development. Variability of rainfall is more in Buldhana, Akola, Amravati and Yavatmal districts whereas it is moderate and low in other districts.

5) Seven types of soils are found in Vidarbha region. Medium black soils, deep black soils and shallow black soils are more suitable for agriculture development as compared to coarse laterite, yellowish and brown soils.

Out of the total geographical area below 10% area was found under forest whereas 10% to 20% area was observed under forest in Buldhana, Yavatmal, Wardha and Nagpur district during 1995-2000. About 20% to 30% forest area was observed in Bhandhra and Amravati whereas above 30%
geographical area was recorded under forest in Chandrapur (35.75%) and Gadchiroli (74.44%) during the same period. There is little scope in Chandrapur and Gadchiroli district for agricultural development.

6) There are 18 major projects in the study region. The work of two projects i.e. Karwafa and Tultuli is not in progress due to forest area. Other 14 major projects are completed and two are in progress. Upper Wardha Project which is situated in Morshi tahsil, district Amravati is one of the biggest project in the region. It was completed in 1993 and Rs. 75420 lakh amount was spent on it. Nearly 100 km. canal is constructed from this project. About 83000 hectare irrigational potentials are created in 1975. Khadakpurna, Bemla, Kalsarar, Karwafa, Tultuli projects were dry in 2000-2001. During 2000-2001 about 110564 hectares of land was brought under irrigation from fourteen major irrigation projects.

7) Nearly 4.13 lakh hectare land will brought under the irrigation after the completion of entire work of the major dams. The storage capacity of the major dams is 3396.31 million cubic metres whereas 4.62 lakh hectare land is suitable for the cultivation in the jurisdiction of all major dams. Major projects have changed the cropping pattern of the study region. Agricultural productivity is increased to a greater extent hence, the standard of living of the farmers increased to some extent.

8) Eighty one medium irrigation projects have created 304346 hectares irrigational potential in the region. Nearly 110863 hectares land was brought under irrigation in 2000-2001 from the medium projects. Cropping pattern is changed from foodgrains to cash crops in the jurisdiction of medium project area. Nearly 20.99% of medium projects are found in Yavatmal district whereas only 4.94 projects are observed in Gadchiroli district. During 2000-2001 Purna, Sakedari, Bhor, Chandrabhaga, Jambnala, Chamdoh, Panchdhara, Hivarana, Pendharinala, Dongargaon, Chenna, Pohar and Khobragadi medium projects were found empty hence they have not pro-
vided water to single hectare.

9) Table 3.3 reveals that there is uneven distribution of minor irrigation schemes in the study region. Out of the total minor schemes about 33.19% schemes were concentrated in Nagpur district during 2000-2001. The shares of Bhandara, Chandrapur, Gadchiroli, Akola, Buldhana, Yavatmal, Amravati and Wardha were 24.36%, 15.62%, 12.93%, 4.98%, 3.61%, 3.15%, 1.93% and 0.23% respectively in 2000-2001. About 4.56 lakh hectare irrigation potentials are created by the minor irrigation schemes in the Vidarbha region upto 2000-2001. In 2000-2001 actual 3.50 lakh hectares of land was irrigated by the minor irrigation schemes because rainfall distribution was satisfactory in the study region. Minor irrigation schemes are playing important role in increasing agricultural productivity.

10) Table 3.4 indicates that use of irrigational wells in not uniform in the study region. Nearly 20% to 30% irrigational wells were not in use in Gadchiroli, Bhandara, Buldhana and Amravati districts whereas 30% to 52% irrigational wells were not in use in Nagpur, Chandrapur, Yavatmal and Wardha districts in 1970-71. The highest proportion of used irrigation wells was recorded in Chandrapur (93.95%) district whereas the lowest proportion of used irrigation wells was recorded in Akola (77.61%) district in 2000-2001. Most of the irrigation wells becomes dry in summer season. Even some wells are not having water in rainy and winter season due to variability of monsoon rainfall.

11) Bhandara was leading in area under irrigation where nearly 52% net down area was under irrigation whereas only 4% net sown area was observed under irrigation during 1995-2000. All districts showed positive change in irrigation facilities. Modern technology, five year plans, use of high yielding variety seeds, pesticides and chemical fertilizers are the responsible factors for the positive change in irrigated area.

12) Annual growth rate of population 2.55% to 3.62% in all districts ex-


cept Wardha district where growth rate was 1.58% during the period of
investigation. Hence, crude, physiological, agricultural and coloric densi-
ties where more in all the districals of study region. It is essential to control
the growth rate of population by hook or crook in near future to reduce the
population pressure on land.

13) Amravati, Chandrapur, Yavatmal and Gadchiroli districts are hav-
ing 17% to 79% geographical area under forest, hence, crude density is less
in these districts as compared to other districts. Table 3.9 indicates that
literacy rate was increased to a greater extent in every district during the
period of investigation. Literacy percentage was increased more than two
and half times in Gadchiroli and Chandrapur districts and two time in other
districts during the period of investigation. Out of the total population below
70% literate population recorded in Gadchiroli and 70% to 80% literate
population was found in Buldhana, Akola, Yavatmal, Bhandara and
Chandrapur districts in 2001. Above 80% literate population was recorded
in Wardha, Amravati and Nagpur districts in 2001. This literate population
will support to the use of high yielding variety seeds, chemical fertilizers and
modern technology etc in large scale in near future.

14) Cattle population was increased in every district but percentage
share of cattle in total livestock decreased to some extent hence, they have
shown negative change during the period of investigation. About 0.02% to
23.25% negative change was recorded in Buldhana, Akola, Amravati,
Yavamal, Wardha, Gadchiroli, Chandrapur and Bhandara districts whereas
only 3.15% positive change in cattle population took place between 1972
and 1997.

15) About 1.14% to 24.58% positive change in buffaloes population
was registered in Gadchiroli (2.36%), Bhandara (3.24%), Wardha (1.59%),
Yavatmal (1.50%) and Akola (24.58%) whereas about 1.21 % negative
change in buffaloes number was registered in Nagpur, Buldhana and Amravati
districts from 1972 to 1997.

16) About 0.15% to 2.79% negative change in sheep population was recorded in Akola, Amravati, Wardha, Nagpur, Bhandhara and Gadchiroli districts and 0.08% to 2.1% positive change in sheep population was took place in the rest of the districts during the period of investigation.

17) Map 3.11 B rereals that below 1% negative chnage in goat popula- 
tion was recorded in Akola and Nagpur districts whereas 5% positive change in goat numbers book place in Buldhana (0.42%) and Gadchiroli districts from 1972-1997. About 5% to 8% positive change in goat population was observed is Wardha, Yavatmal districts whereas above 8% positive change in goat population was recorded in Amravati, Bhandara and Chandrapur districts between 1972 and 1997 (Map 3.11 B).

No change was observed in livestock combination except Akola district where cattles buffaloes, goat and sheep combination were observed instead of cattle goat, buffaloes and sheep in 1997 (Map 3.12 B).

18) Table 3.11 indicates wooden ploughs are dominating in plough machinery in the study region. Wooden ploughs are used on large scale in Gadchiroli, Chandrapur and Yavatmal districts whereas iron ploughs are used on large scale in the remaining districts. Electric pumps increased by 4.34 times during the period of investigation and oil engines increased by 2.19 time during the period under study. It means that electric pumps increased in every districts due to increase in irrigation wells, tanks and other irrigational sources from 1972 to 1997.

19) Farmers use power driven machinery for farm operation when the human and bullock driven implementnts prove to be costlier and in efficient. Therefore, the farmer need tractors for ensuring timely opertions and for reducing the dependency on the uncertainties of hired labour.

Number of tractors increased by 14.63 times in the study region. They are increased in every district due to increase in farmers income and
literacy during the period of irrigation.


21) Out of the total use of pesticides below 5% pesticides were used in Chandrapur and Gadchiroli district because in these districts net sown area is very limited. About 18510 metric tonnes liquid pesticides were used in Vidarbha region in 2000-2001. Out of the liquid pesticides nearly 18.04% were used in Nagpur in 2000-2001. The shares of Yavatmal, Amravati, Akola, Buldhana, Wardha, Bhandara, Chandrapur and Gadchiroli districts were 15.78%, 14.26%, 12.10%, 9.83%, 9.78%, 9.40%, 5.94%, and 4.86% respectively in 2000-2001. The highest other pesticides were used in Nagpur and the lowest pesticides used in Gadchiroli districts. As far as fungicides are concerned there is variation in use of pesticides in entire region. Only 3.93% fungicides were used in Gadchiroli and 20.52% fungicides were used in 2000-2001.

Vidarbha region is leading in cotton production in the state of Maharashtra hence, use of pesticides is more as compared to other districts of the state.

22) Table 3.14 reveals that use of high yielding seeds increased by 1.86% times during the period of investigation. Below 5% consumption was recorded in Gadchiroli district and 5% to 10% consumption was observed in Amravati, Nagpur, Bhandara and Chandrapur districts in 1999-2000. About 10% to 20% high yielding seeds increased in the study region due to in-
crease in irrigation facilities and rate of literacy percentage.

23) Table 3.15 reveals that only 2.87% of region's credit societies were concentrated in Gadchiroli district whereas nearly 17.24% regions primary credit societies were observed in Nagpur, Akola, Bhandara and Amravati districts and 35% to 50% loan recovery was found in Buldhana and Wardha districts in 2000. Above 50% loan recovery was recorded in Yavatmal, Chandrapur and Gadchiroli districts.

24) About 0.016 to 0.053 density of sub-markets per 1000 hectare was recorded in all districts during 2000-2001. It means there is variation in the density of main and sub-markets in the study region. Even farmers are not getting proper price in the market in the study region.

Railway length per 1000 hectare was 0.03 kilometres to 0.33 kilometres in Akola, Buldhana, Gadchiroli and Amravati districts whereas it was upto 0.97 km. per 1000 hectare in remaining districts. It means that railway network is quiet better for the shifting of agricultural goods from the place of production to the place of consumption.

25) Below 1% positive change in forest area was recorded in Buldhana, Yavatmal and Nagpur districts on the other hand above above 1% positive change in forest area was recorded in Bhandara and Chandrapur (4.97%) during the period under study. Below 1% negative change in forest area was observed in Akola, Wardha and Gadchiroli districts while above 1% negative change in forest area was noticed in Amravati district between 1970-75 and 1995-2000 (Map 4.3B).

26) Table 4.1 indicates that below 1% positive change in area available for cultivation was recorded in Amravati and Nagpur districts and above 1% positive change in this group was noticed in Buldhana, Akola, Bhandara, Wardha and Chandrapur districts during the period of thirty years. Below 1% negative change was observed in Yavatmal and Gadchiroli districts during the period under study (Map 4. B).
27) Below 1% negative change was experienced in Gadchiroli and Bhandare districts while above 1% negative change in other uncultivable land was registered in Buldhara, Akola, Yavatmal, Wardha, Nagpur, Bhandara and Chandrapur districts from 1970-75 to 1995-2000. Below 1% positive change in this group was found in Amravati during the period of thirty years. It is mainly due to the proportion of other uncultivable land which has gone to either the non-agricultural land or agricultural land. Particularly the permanent pastures and grazing lands are brought under cultivation or for other uses.

28) Below 1% positive change in fallow land was recorded in Akola, Gadchiroli, Chandrapur and Nagpur districts whereas above 1% positive change in fallow land was noticed in Wardha (7.63%) from 1970-75 to 1995-2000. Below 1% negative change in fallow land was experienced in Bhandara, Amravati, Yavatmal form 1970-75 to 1995-2000 (Map 4.6 B). Negative change was occurred in some districts because some fallow land was brought under cultivation and some cultural area was converted in to fallow during the period of thirty years.

29) Below 1% negative change in net sown area was observed in Buldhana, Nagpur districts on the other hand above 1% negative change in net sown area was recorded in Bhandara (2.73%) and Wardha (6.75%) districts between 1970-75 and 1995-2000. Below 1% positive change in net sown area was found in Gadchiroli, Chandrapur and Akola districts while above 1% positive change in Yavatmal district between 1970-75 and 1995-2000. The reduction within the area under crop is due to the increasing fallow land in every districts. So it is necessary to bring fallow land under cultivation.

30) Below 0.2 hectare per capita land was found in Bhandara and Nagpur districts whereas 0.2 hectare to 0.3 hectare per capita land was recorded in Gadchiroli and Chandrapur districts in 2001. In the rest of the
districts above 0.3 hectare per capita net sown area was recorded during the same year. It means that per capita net sown area decreased to a greater extent due to increase in population number in the study region during the last two decades.

31) Table 4.3 and Map 4.8 clearly indicates that Chandrapur and Wardh district have shown dynamic change in landuse during the period of investigation. Districts like Amravati, Nagpur and Bhandara showed semi-dynamic change on the other hand Buldhana, Yavatmal, Akola and Gadchiroli districts have showed little change in landuse categories.

32) The proportion of potential agricultural land i.e. cultural waste land decreased from 10.68% to 8.73%. There is more scope for extension of cultivated land by bringing fallow and potential agricultural land under cultivation in the study region. We can bring more land under agriculture in the study region. About 10.97% more land can be brought under cultivation from potential agricultural and fallow land in near future. Therefore immediate need is to give more emphasis on intensity of cropping and increasing yield from existing cultivated area. Problem of under use of net sown area, low productivity and risk of crop failure are taxing the rural population, therefore it is fruitful to accelerate the degree of intensity with which the net sown area is utilized.

33) The rice area increased in 16 years from 1970-71 to 1999-2000. The rice area was increased by 96.5 thousand hectares in 1999-2000 and it was increased by only 5400 hectares in 1998-99. Table 5.2 reveals that indices of rice area was below 100% throughout the study area. Rainfall variability is responsible for the variation in index number of rice form 1970-71 to 1999-2000.

Table 5.2 indicates that indices of wheat area was below 100% to 200% in fourteen years. wheat area indices was above 200% to 300% in remaining years.
34) Jowar area showed decrease in 17 years out of the thirty years. Index number of jowar was above 100% from 1972-73 to 1983-84 due to favourable climatic condition but it was found below 100% form 1984-85 to 1999-2000. Index number of Bajara was decreased up to 59.95% in 1999-2000. Below 100% bajara indices was found in 15 years whereas about 305.4% index was observed in 1978-79.

35) Table 5.1 indicates that tur area in Vidarbha region showed negative change in tur area in 12 years from 1970-71 to 1999-2000. The lowest positive change was observed in 1998-99 and the highest positive change in tur area was found in 1985-86.

Indices of gram area was below 100% only in 1971-72 and 1972-73 whereas it was above 100% during the period of investigation. Index number of gram area was increased by 316.77% from 1970-71 to 1999-2000.

36) Indices of oil seeds showed ups and downs during the period of investigation. It has shown change in indices of oil seeds due to variability of rainfall during the period of thirty years. Index number of groundnut area was found above 100% in 1972-73, 1976-77, 1977-78, 1978-97 and 1996-97. Otherwise it was below 100% throughout the study period. Indices of groundnut area was decreased up to 31.26% from 1970-71 to 1999-2000. Table 5.1 reveals that safflower area decreased in 11 years during the period of investigation. The index number of safflower area was constantly above 100% during the period of investigation.

37) Cotton in major cash crop in Vidarbha region. Negative change in cotton area was experienced in 11 years form 1970-71 to 1999-2000. Index number of cotton area in Vidarbha was below 100% in 12 years. Whereas it was increased above 100% in remaining years. It was increased by 0.52% during the period of investigation. Sugarcane area decreased in 12 years from 1970-71 to 1999-2000. Indices of Sugarcane area in Vidarbha region was above 100% upto 1983-84 and it was above 200% to 512% form 1984-
85 to 1999-2000 except 1985-86. Increase in irrigation facilities is resposable for the growth of index number of sugarcane area during the period under study.

38) About 5% to 20% Co-efficient of area variability was observed in cotton (5.13%) rice (6.78%) and jowar (18.34%) crops area during the pe- riod of investigation. It meas that there is gurantee of there crops. About 20% to 30% Co-efficient of area variability was recorded in groundnut, other pulses and bajara crops whereas above 30% area variability was experi- enced in other selected crops area from 1970-71 to 1999-2000. Below 1% negative compound growth rate in area was recorded in bajara and rice crops area whereas wheat, jawar and other cereals showed above 1% negarive change in compound growth rate between 1970-71 and 1999-2000. Below 2% positive compound growth rate was registered in the area of safflower, groundnut and other pulses while 2% to 3% compound growth rate in area was experienced in tur and gram during the period under study.

39) Table 5.4 reveals that the percentage share of gram, tur other pulses, safflower, other oilseeds, sugarcane and cotton in gross cropped area were constantly increased during the period of thirty years. Gross cropped area was also constantly increased from first quinquennium to last quinquennium. Impact of change in technology, economic and institutional factors can be felt only when the existing cropping pattern undergoes a change. Generally, the farmers have a tendency to stick to a stable cropping pattem under any given agro- climatic factors and the crops that could be grown within a par- ticular enviroment. Generally the farmers have a tendency to stick up to a stable cropping pattern in Vidarbha.

40) Below 1% negative change in rice area was recorded in Buldhana, Akola and Amravati districts on the other hand above 1% negative change in rice area was took place in Wardha distitict between 1970-71 and 1999-2000. Below 1% positive change in rice area was registered in Nagpur and
above 1% positive change in rice area was recorded in Chandrapur (3.68%), Yavatmal (6.13%) and Bhandara (18.66%) districts during the period of thirty years.

41) Below 1% positive change in wheat area was took place in Yavatmal (0.17%) from 1970-75 to 1995-2000. Below 2% negative change in wheat area was registered in Buldhana (0.61%) and Gadchiroli (0.71%) districts whereas above 2% negative change in wheat area experienced in Amravati, Akola, Wardha, Nagpur, Bhandara and Chandrapur districts between 1970-1975 and 1995-2000 (Map 5.2 B). Variability of rainfall in winter season is responsible for the negative change in wheat area from 1970-75 to 1995-2000.

Below 4% negative change in jowar area was observed in Amravati, Yavatmal and Chandrapur districts and 4% to 8% negative change in jowar area was took place in Bhandara and Akola districts during the period of investigation. Above 8% negative change in jowar area was recorded in Bulbhana, Bhandara, Nagpur and Wardha districts (Map 5.3 B) form 1970-75 to 1995-2000.

42) Very mior negative and positive change in Bajara area was recorded in all districts except Gadchiroli district from 1970-75 to 1995-2000.

Below 1% negative change in other cereals area was took place in Buldhana, Akola and Bhandara districts and above 1% negative change in other cereals area was recorded in Amravati and Gadchiroli districts. About 5.72% positive change in other cereals was recored in Yavatmal district due to variability of rainfall and farmers attitudes during the period of thirty years.

43) Below 1% negative change in gram area was experienced in Yavatamal and Gadchiroli districts and below 1% positive change in gram area was recorded in Wardha, Bhandara and Chandrapur districts between 1970-75 and 1995-2000. Positive change in gram area was recorded in Buldhana, Amravati, Akoka and Nagpur from 1970-75 to 1995-2000.
Below 2% negative change in tur area was recorded in Gadchiroli district and below 3% positive change in tur area was recorded in Nagpur, Bhandara, Yavatmal and Chandrapur districts from 1970-75 to 1995-2000. Above 3% positive change in tur area was took place in Buldhana, Akola and Wardha districts from 1970-75 to 1995-2000.

44) Oil seeds crop area also showed negative and positive change in their area dur rainfall to rainfull variability and shortage of irrigational facilities.

About 3% positive change in cotton area was registered in Chandrapur and below 5% negative change in cotton was took place in Buldhana and Yavatmal districts whereas 5% to 10% negative change in cotton area was found in Akola, Wardha and Nagpur districts during the period of thirty years. Above 10% negative change in cotton area took place in Amravati from 1970-75 to 1995-2000. Particularly physical and non-physical determinants of agriculture are responsible for the negative and positive change from 1970-75 to 1995-2000.

45) Below 0.3% positive change in cotton area was observed in Buldhana, Akola, Chandrapur, Bhandara, Nagpur and Wardha districts whereas above 0.3% positive change was recorded in remaining districts during the period of investigation.

About 0.05% to 2.48% negative change in fodder crops area was took place in Wardha, Nagpur, Bhandar, Chandrapur, Yavatmal, Gadchiroli, Akola and Buldhana districts and about 0.74% positive change in fodder crops area was experienced in Amravati district during the period under study.

46) During 1970-75, monoculture was found in Bhandara districts whereas two crop combiration was experienced in Buldhana. Akola, Amravati, Yavatmal, Wardha, Chandrapur and Gadchiroli districts during 1970-75. Three crop combination was recorded in Nagpur districts during same period (Map 5.15 A)
No change was experienced in Akola, Amaraviti, Yavatmal, Wardha, Chandrapur and Gadchiroli districts while two to three crop combination shift was recorded in Buldhana and three to two crop combination was registered in Nagpur districts between 1970-75 and 1995-2000 (Map 5.15 B).

47) No change in level of rice concentration was observed in the study region except Yavatmal where low to high shift was recorded during the period of investigation.

High to low level concentration shift in Wheat area was found in Akola and Amravati districts and high to moderate level of shift was noticed in Chandrapur, Buldhana and Bhandara districts during the period of thirty years. No change in wheat crop concentration was registered in Gadchiroli, Nagpur, Wardha and Yavatmal district during the period under study (Map 5.17 B).

48) No change in jowar concentration was took place in Amravati, Bhandara and Gadchiroli districts during the period of investigation. Bajra is raised on small-scale in this region due to unfavourable geographical condition.

No change in tur concentration was registered in Buldhana, Akola, Amravati, Yavatmal, Wardha, Nagpur, Bhandara, Chandrapur and Gadchiroli districts during the period of thirty years.

49) No change was registered in groundnut concentration in Amravati, Bhandara, Chandrapur and Gadchiroli districts and moderate to low shift in groundnut concentration was took place in Bulshana and Akola districts from 1970-75 to 1995-2000. Low to high level of groundnut crop concentration shift was found in Wardha and Nagpur districts. High to low shift was experienced in Yavatmal during the period of investigation. Physical and non-physical determinants of agriculture are responsible for the change in groundnut crop concentration from 1970-75 to 1995-2000.

50) Areas of high diversification of crops was found in Amravati, Nagpur,
Bhandara, Buldhana and Chandrapur district and areas of moderate diversification was associated in Akola, Wardha and Yavatmal districts during 1970-75. Areas of low diversity was recorded in Gadchirol district the same period (Map 5.21 A). During 1995-2000 areas of high crop diversification was recorded in Buldhana, Akola, Wardha, Nagpur, Chandrapur districts whereas areas of moderate diversification was registered in Gadchirol, Amravati and Yavatmal districts. Areas of low diversification was found in Bhandara during the same period. Fluctuation in rainfall distribution, level of underground water, rate of irrigation and farmers attitudes are the responsible factors the crop diversification in the study region.

51) Table 6.1 reveals that annual production growth rates judged by three year 1970-71 to 1972-73 and 1997-98 to 1999-2000 of selected 12 crops showed 2% to 35.48% positive annual growth and only groundnut recorded about 1.02% negative annual growth rate during the above mentioned period. Variability of rainfall, increase or decrease in irrigated area and other man made factors are responsible for the above mentioned change during the period of investigation.

52) Indices of all selected crops showed ups and downs during the period of investigation. Rice production showed negative change in 17 years, wheat in 12 years, jowar in 14 years and other cereals in 8 years from 1970-71 to 1999-2000. Rice, wheat, bajara, jowar, other cereals indices output also showed ups and downs during the period of thirty years due to physical and non-physical determinants of agriculture.

53) Index number of tur output was above 100% except in 1972-73, 1976-73 and 1991-92. Tur production showed 156.52% positive change during the period under study. Other pulses output increased by 572.04% whereas groundnut output by 41.41% from 1970-71 to 1999-2000.

The highest negative change in safflower output (61800 M.T) was recorded in 1998-99. The highest number of safflower indices (1008.94%)
was recorded in 1993-94 whereas the lowest indices (98.37%) was found in 1972-73.

54) Index number of cotton output showed 197.29% to 691.28% increase during period of thirty years.

In 1990-91 Sugarcane output increased by 501.63% between 1970-71 to 1999-2000. Production of selected crops showed ups and downs in the entire study region due to increase in irrigation, farmers attitude and variability of rainfall.

From column 4 of table No.6.4 indicates that the highest variability (56.20%) was present in the production of sugarcane whereas the lowest variability was present in the production of rice and cotton from 1970-71 to 1999-2000.

55) On examination of compound growth rates presented in table No.6.4 it is quite evident that the production of eleven crops output of out of twelve selected crops in creased during the period under study. Sugarcane output recorded about 9.27% positive change in compound growth rate from 1970-71 to 1999-2000. About 0.14% to 1.06% negative change rice output was recorded in Buldhana, Akola, Amravati, Nagpur and Yavatmal districts whereas 0.25% to 10.34% negative change in wheat production was recorded in Amravati, Nagpur, Chandrapur and Wardha districts between 1970-75 to 1995-2000.

56) Gram and tur production increased by 5.22 times and 2.43 times respectively during the period under study. Safflower is raised on small scale in Gadchiroli, Chandrapur, Wardha and Nagpur districts due to unfavourable climatic conditions. Cotton production increased by 1.99 times and sugarcane output increased by 5.46 times between 1970-71 and 1995-2000.

Average yields of selected crops increased to a greater extent due to increase in irrigated land and use of modern technique during the period of investigation.
57) Indices of selected crops yield showed ups and downs between 1970-71 and 1999-2000 due to the physical and non-physical factors combine effect.

About 0.45% to 3.59% compound positive growth rate was experienced in the case of selected crops except sugarcane during the period of investigation.

58) Bajara, tur, gram, groundnut per hectare yields increased to greater extent due to use of high yielding seeds, increase in irrigation and use of modern techniques in all districts between 1970-75 to 1995-2000. Cotton was not raised in Gadchiroli and Bhandara districts due to unfavourable physical condition between 1970-75 and 1995-2000. Sugarcane yield was increased to medium extent in all districts during the period of investigation.

High level of rice productivity was recorded in Bhandara, Chandrapur and Gadchiroli districts whereas moderate productivity was found in Nagpur during the period under investigation.

59) High productivity of tur was recorded in Buldhana, Akola, Amravati, Yavatmal and Wardha districts due to combine effect of physical and non-physical determinants of agriculture during the period of investigation.

Low level of Bajara productivity was found in Akola, Amravati and Wardha district during 1995-2000 (Map 6.16 B).

60) Overall productivity of food crops was recorded high in Wardha, Nagpur, Chandrapur, Bhandara and Gadchiroli districts whereas it was moderate in Yavatmal, Akola and Amravati districts and low over all productivity was recorded in the last quinquennium (Map 6.19 A). Both physical and non-physical factors are responsible for the high to low level of food crops productivity from 1970-71 to 1999-2000.

61) Table No.7.1 indicates that 0.22% to 1.07% negative change in percentage of net irrigated area to net sown area registered in Bhokar, Govindpur, Dhanora Kokate villages whereas 0.16% to 16.41% positive
change in percentage of net irrigated area to net sown area was recorded in Antora, Nimba, Kinhiraja, Tembhurdara, Bhankhed, Susundra, Belgaon, Kosamtara, Gorre, Sonpuri, Aptur, Tulang, Navegaon, Lendhari, Palapundi during the period of ten years.

62) Cattle was dominating in all selected villages except Palapundi and Belgaon villages during the period of ten years. Buffaloes was ranking second in livestock in Dhanora, Nimba, Kinhiraja whereas goat was ranking second in remaining selected villages from 1990-91 to 1999-2000. Sheep was ranking third in Bhokar and Kosamtara village in both period. Livestock population is supporting to the agricultural development of selected villages of Vidardha region.

63) Wooden ploughs were dominant in agricultural implements in Antora, Nimba, Kinhiraja, Tembhurdara, Bankhed, Bhokar, Aptur and Palapundi in 1999-2000. It means that agriculture of selected villages is traditional and subsistance in nature.

64) Iron ploughs increased in all villages between 1990-91 and 1999-2000. The number of oil engines were decreased in Antora, Dhanora and Bhokar villages whereas its numbers slightly incresed in other selected villages from 1990-91 to 1999-2000. Electric pumps ranks first in agricultural implements in Govindpur, Bankhed, Susundra, Aptur, Navegaon and Lendhari in other selected villages. It ranks second in agricultural implements. Electric pumps increased on large scale from 1990-91 to 1999-2000.

65) The number of tractors are very small in selected villages. Most of the farmers are very poor, hence, they are unable to purchase the tractors. Tractors are increased slightly in all selected villages between 1990-91 to 1999-2000. High proportion of tractor were found in Dhonora, Nimba, Kinhiraja, Bhokar and Tembhurdara villages whereas low to moderate proportion was observed in remaining selected villages.

66) Below 2% negative change in forest area was noticed in
Tembhurdara, Bhankhed and Gorre while zero per cent change was found in Kosamtarra village from 1990-91 to 1999-2000. In remaining villages below 3% change recorded during the period of ten years.

Area under forest is above 50% in Antora, Govindpur, Kosamtara, Tulang, Palapundi and Lendhari villages. Hence, there is very little scope for agricultural development in above selected villages.

67) About 0.02% to 1.32% positive change in area not available for cultivation was recorded during the period of ten years in selected villages of Vidardha region. Positive change was occurred in area not available for cultivation was recorded in selected villages due to transfer of culturable waste area to this categories between 1990-91 and 1999-2000.

68) About 13% to 25% fallow land was noticed in Dhanora kokate, Tembhurdara, Bhankhed, Bhokar, Susundra, Gorre and Aptur villages. About 0.39% to 4.58% negative change in fallow land was experienced in Lendhari, Palapundi, Tulang, Aptur, Kosamtarra, Susundra, Bhankhed, Nimba and Dhanora kokate villages whereas 0.27% to 1.93% positive change in fallow land was observed in remaining selected villages from 1990-91 to 1999-2000. This positive change was occurred due to transfer of net sown area under this categories.

69) Below 30% geographical area was observed under net sown area in Antora, Govindpur, Kosamtarra, Lendhari, Palapundi and Tulang villages during 1999-2000. About 30% to 60% geographical area was found under net sown area in Bhankhed, Bhokar and Navegaon where as above 60% geographical area in remaining selected villages in 1999-2000.

About 0.26% to 6.06% positive change in net sown area was noticed in Tembhurdara, Bhankhed, Bhokar Susundra, Gorre, Sonpuri, Aptur, Palapundi and Lendhari villages between 1990-91 and 1999-2000. About 0.4% to 4.25% negative change in net sown area was recorded in the rest of the selected villages between 1990-91 and 1999-2000. Some fallow land area and
culturable waste land was transferred to net sown area, hence, positive change was occurred in above mentioned villages from 1990-91 to 1999-2000.

70) About 0.23% to 5.06% negative change in jowar area was recorded in Lendhari, Sonpuri, Belgaon, Antora, Nimba and Bhokar villages whereas 0.18 to 6.10 positive change in jowar area was recorded in remaining villages from 1990-91 to 1999-2000.

During the period of ten years wheat showed about 0.53% to 1.89% negative change in Lendhari, Palapundi, Navegaon, Tulang, Aptur, Kosamtara, Gorre, Belgaon, Nimba, Tembhurda, Govindpur, Bankhed, Susundra and Bhokar villages. About 0.4% to 7.29% positive change in wheat area was recorded in remaining selected villages. Very little positive and negative change in rice area showed in all villages except Tembhurda, Belgaon, Gorre, Kosamtara, Sonpuri where 2% to 8% negative and positive change was occurred during the period of ten years.

71) About 0.02% to 5.55% negative change in tur area was took place in Antora, Dhanora kokate, Kinhiraja, Tembhurda, Govindpur, Bankhed, Susundra, Sonpuri, Tulang, Palapundi and Lendhari whereas about 0.08% to 2.11% positive change in tur area was recorded in remaining villages during the period of ten years.

72) The highest positive change in groundnut area was recorded in Nimba village whereas 0.08% to 4.46% negative change in groundnut area was recorded in remaining villages except Tembhudara, Govindpur, Bankhed, Nimba villages from 1990-91 to 1999-2000.

All villages showed light change in safflower and sunflower even during the same period.

73) Cotton area showed positive change in some villages particularly 0.57% to 7.51% positive change in cotton area was recorded in Antora, Nimba, Kinhiraja, Bankhed, Bhokar, Susundra, Belgaon, Gorre, Kosamtara,
Aptur, Lendhari, Palapundi and Tulang villages whereas 0.43% to 8.7% negative change in cotton area was recorded in rest of the selected villages during the period of ten years. Variability of rainfall, level of under ground water and farmers attitude these factors are responsible for the positive and negative change in their area during the period of ten years.

74) About 0.05% to 2.2 % negative change in sugarcane area was experienced in Gorre, Sonpuri, Tulang, Navegaon, Dhanora Kokate, Tembhurdara and Susundra while 0.16% to 2.98% positive change in sugarcane area was recorded in remaining selected villages between 1990-91 and 1999-2000.

About 0.16% to 2.80% negative change in fodder crops area was took place in Lendhari, Sonpuri, Gorre, Dhanora Kotate, Tembhurdara and Susundra on the other hand 0.09% to 6.19% positive change in remaining selected villages of the Vidardha region between 1990-91 and 1999-2000.

75) Selected villages of Vidarbha region are facing problems of drought, poor techniques of production, lack of irrigation, discouraging rural atmosphere, credit facilities, irregular supply of electricity, grazing land, chemical fertilizers, low productivity and low prices.

It is essential to increase irrigation facilities in the study area by hook or crookes.

76) Three districts viz. Bhandara, Buldhana and Akola have recorded high level of agricultural development whereas Wardha and Nagpur districts showed moderate agricultural development during the period of investigation. Low development of agriculture was recorded in Amravati, Yavatmal, Chandrapur and Gadchiroli districts from 1970-71 to 1999-2000. Both physical and man- made environmental factors are resposible for the agricultural development in the study region.

8.3: Agricultural Problems of Vidarbha Region.

In theis part we consider a various problems of agricultural developmet.
Most of which are linked to the question of agricultural research and training. Problems associated with the agriculture are too numerous to describe all of them in detail. Nevertheless the most important problems of study regions agriculture may be mentioned in order to highlight their nature.

1) Untimely and Unequal Distribution of Rainfall:

A timely and adequate supply of water is absolutely essential for security of the maximum output from the land. Percentage of irrigated land to net sown area varies from district to district in Vidardha region. Below 10% net sown area was found under irrigation in Buldhana, Akola, Amravati, Yavatmal, Wardha districts whereas 10% to 30% irrigated area to net sown area was found in Nagpur, Chandrapur and Gadchiroli districts during 1995-2000. Only Bhandara district was having 52% net sown area under irrigation. It means that nearly 80% net sown area is dependent on rainfall in Buldhana, Akola, Amravati, Yavatmal and Wardha districts. Rainfall decreases from district to district in the study region. Particularly from west to east and from north to south.

2) Soil Erosion:

The problem of soil erosion is a complicated problem. Soil erosion varies from place to place according to the character of the soil, the slopes of the ground, the vegetation cover, the use to which the soil is being put and according to the nature and amount of the rainfall. More soil erosion is found in Govilgarh, Narnala, Ajanta range, eastern hilly area, piedmont region, Arvi upland, Ramtek upland and river basins of Wardha and Wainganga. Soil erosion varies from place to place in entire study region.

3) The Problem of Sub-Division and Fragmentation of Holdings:

The problem of agricultural holdings in the study region is two fold. Not only the average holding are small but they are also fragmented and are found not in one compact block but in tiny plots scatteerd all over the
villages. Each holding consists of many small pieces which are found in different parts of the study region. Small size of farms occurred in Gadchiroli, Chandrapur, Yavatmal, Nagpur, Buldhana, Akola, Amravati, Bhandara and Wardha districts.

Couses of Small Size of Holding in Vidarbhar Region :

i) Growth of Population :

Fast growing population in the study region has placed heavy pressure on the fixed supply of the land. The population of the study region increased by 76.48% during the period investigation. Growth rate of population was below 50% in Bhandara district whereas it was about 50% to 70% in Wardha and Amravati districts from 1971 to 2001. About 70% to 90% population growth was observed in Buldhana, Akola, Yavatmal and Gadchiroli districts and above 100% growth rate was noticed in Nagpur district during the period of thirty years.

ii) The Law of Inheritance :

Another important factor giving rise to the small size of holdings is the operation of the law of inheritance. After the death of the father his land gets divided among all his sons.

iii) Deline of Joint Family System :

Under the joint family system the land of the whole family was hold and cultivated jointly. With the break down of this system the number of small holdings has increased.

Out of the total holding about 45% holding area was mariginal (below 1 hectare ) and small holdings (below 2 hectare) area was 11% whereas medium holdings are (above 5 hectares) was 44% in the study region.

4) Problem of Regional Imbalances :

The following points shows us regional imbalances in agricultural developmet of the study region.
i) Out of the total geographical area below 10% area was observed under forest in Akola district and 10% to 20% geographical area was recorded under forest in Buldhana, Yavatmal, Wardha and Nagpur districts during 1995 - 2000. About 20% to 30% area was found under forest in Bhandara and Amravati districts whereas above 30% geographical area was noticed in Chandrapur (35.75%) and Gadchiroli (74.44%) districts during 1995-2000. It means that there is regional disparities in forest area.

ii) Out of the total geographical area below 15% area was net sown area in Gadchiroli district whereas 15% to 45% geographical area was observed under cultivation in Bhandara (39.13%) and Chandrapur (43.53%) during 1995-2000. About 45% to 70% geographical area was noticed under cultivation in Nagpur, Wardha, Yavatmal, Amravati districts and above 70% geographical area was observed under cultivation in Buldhana and Akola district during 1995-2000.

iii) Out of the total cultivated land below 10% area was observed under irrigation in Buldhana, Akola, Amravati, Yavatmal, Wardha and Nagpur districts whereas 10% to 25% net sown area was found under irrigation in Nagpur (15.99%) and Chandrapur (22.67%) during 1995-2000. Above 52% net sown area was recorded under irrigation in Gadchiroli but there is very little scope for expansion of agricultural land due to forest area.

iv) Out of the regions total tractors below 2% tractors were observed in Gadchiroli and 2% to 5% tractors were observed in Wardha district in 1997. About 5% to 10% tractors were found in Chandrapur and Yavatmal districts and above 10% to 20% tractors were recorded in Akola (12.37%), Nagpur (10.6%), Bhandara (18.55%) and Buldhana (19.52%) districts in 1997.

v) There is also regional disparities in the area of various crops and production and productivity in the study region. The above mentioned points clearly indicates that there is serious problem of regional imbalances in agricultural development.
5) Lack of Irrigation:

Water is the primary requirements for the success of agricultural crops. Even today 90% net sown area is dependent on rainfall in Buldhana, Akola, Amaravati, Yavatmal and Wardha districts. Our God of rain therefore continues to enjoy a supreme position in deciding the nature and level of agricultural production in the study region. There is gambling in rainfall and it is fully evidenced by the repeated occurrence of drought conditions during the period of investigation.

There are 18 major irrigation projects, 81 medium projects, 16582 minor irrigation schemes and 234041 irrigated wells in the study region. Even then there is serious irrigation problem in the study region due to variability of rainfall.

6) Problems of Soil Fertility Index:

Three contents like Nitrogen, Palash and Potash must be sufficient in the soil fertility and productivity of soils depends upon certain elements like nitrogen, potashim, phosphorous, surphur, humus etc. for proper growth of plants. According to districtwise. Agricultural Statistical Information of Maharashtra, part II, 2000-2001, soils of all tahsils in Buldhana, Akola, Gadchiroli, Bhandara, Chandrapur, Yavatmal, Amravati and Wardha were having very low potash contents whereas some tahsils of Nagpur were having moderate potash content in soils during 1999-2000.

Palash content was found very high in soils of Gadchiroli, Chandrapur, Wardha, Amravati, Akola and some tahsils of Nagpur district whereas high content of palash was observed in remaining areas of the study region during 1999-2000. Nitrogen content in soil was found low in all tahsils of Chandrapur, Gadchiroli, Amravati, Yavatmal, Wardha whereas Nitrogen content was found moderate to high in the soils of Akola, Nagpur, Buldhana and Bhandara districts during 1999-2000. Less use of compost fertilizer to the agriculture is the major reason for less content of nitrogen, Palash and
Potash Contents in the soil.

7) Discouraging Rural Atmosphere:

The farmers of selected villages are poor, illiterate, ignorant, superstitious, conservative and bounded by out moded customs and institutions such as the caste system and joint family. Superstition and belief in fate financial limitation are the causes which keeps farmers self satified with primitive system of cultivation. Besides they are so poor and living their life in such a miserable conditions that they did not have the means to improve their economic conditions.

Most of the farmers form selected villages are poor hence they are not adopting modern technighes of agriculture on large scale. Therefore farmers are facing economic problems on large scale.

8) Agricultural Implements and Machinery:

Most of the farmers of the study region are using out moded agricultural implements. Wooden ploughs were dominant in Amravati, Yavatmal, Nagpur, Bhandara, Chandrapur and Gadchiroli districts on the other hand iron ploughs were dominant in remaining districts in 1997. Table 3.11 indicates that number of wooden ploughs and iron ploughs increased by more than one and half times from 1972 to 1997. Total number of tractors increased by 14.69 timmes during the period of investigation. Even then the density of tractor per 100 hectare is very less in every district. Eelctric pumps increased from 39786 to 172674 between 1972 and 1997. Even than these pumps are unable to increase irrigated land due to scarcity of water in the region.

9) Problems of Plant Projection:

Not a single hectare was found under cotton in Bhandara and Gadchiroli district between 1970-75 and 1997-2000. Below 10% area was observed under cotton in Nagpur where as about 30% to 45% net sown area was recorded under cotton in Chandrapur, Amravati, Wardha, Akola, Buldhana, Yavatmal during 1995-2000. Cotton requires lot of pesticides.
So far, no systematic quantitative studies have been conducted to determine the losses caused by insects, pests and plant diseases in Vidarbha region. Pest and diseases are invariably limiting factors in crop protection. Leaf - miror and leaf spot diseases in groundnut, mosaic in horsegram, stembore and shoot fly in pearl millet, stembore and leaf hoppen in Mango, stembore and blast in rice and stem weevil and white fly in cotton are among the more serious plant protection problems encountered. Above mentioned problems occurred in all tahsils of the Vidarbha region majority farmers of the Vidarbha region are poor, hence they are unable to use pesticides on large scale. About 18510 M.T. liquid pesticides, 272.98 M.T. Granules pesticides and 45.8 M.T fungicides were used in Vidarbha region in 2000-2001.

10) Less Use of Chemical Fertilizers:

Now a days compost fertilizers are not used on large scale due to scarcity of the compost fertilizer. Fertilizer constitute the most important input in modern agriculture and acts as major contributor to increase agriculture and acts as major contributor to increase agricultural production. The constant and intensive use of land leads to depletion of its important nutrients such as nutrients such as nitrogen, phosphorus sulphar and eventually results in the permanent and eventually results in the permanent loss of fertility. Soils should have contain nitroren, phosphorus, potassium, sulphar, calcium, magnesium, zinc, iron, manganese, copper etc. Though all the above nutrients are present in all soils yet many soils may be deficient in one, two or several nutrients from the point of view of practical crop production. It is essential to use compost fertilizer and chemical fertilizer in the farm to increase the fertility of soil.

Use of chemical fertilizer increased in every district from 1984-85 to 2000-2001. Nearly 8.52 lakh metric tonnes chemical fertilizer were used in the study region during 2000-2001. The highest use of chemical fertilizer was found in Buldhana (15.37%) and Yavatmal (15.38%) on the other hand
the lowest use of chemical fertilizers were found in Gadchiroli (3.26%) and Amravati (3.62%) districts in 2000-2001. Even then there is problem of less use of chemical fertilizer in every district of the study region during the period of investigation.

11) Less Use of High Yielding Variety Seeds:

Agriculture in the study region more over suffers from the application of in adequate and bad seeds. Usually seeds are laid added and kept unprotected for the next sowing season. Thus seed is badly affected by the worms and when sown the resulting plant also turn unhealthy. Sometimes the farmers have to open their seed-sector for consumption and for sowing purpose borrow it from the local grain merchants or Baniya which is bad and unhealthy. Therefore, yield of crop is very low in Chandrapur, Gadchiroli, Bhandara, Yavatmal and some parts of Akola, Buldhana, Wardha etc.

Use of high yielding variety seeds increased from 58587 metric tonnes to 108786 metric tonnes between 1984-85 and 1999-2000. Out of the total use only 0.14% HYV seeds were used in Gadchiroli. The highest use of HYV seeds was found in Akola (24.43%) in 1999-2000.

12) Problem Indebtedness:

Capital puts definite limitations on agricultural practices. All farmers take their decision on the basis of capital. The farmer take loan advances for the following purposes.

i) Payment of local revenue and rent.
ii) Purchase of agricultural implements and transports equipments.
iii) Purchase of seeds, Chemical fertilizers, cattle, payment of labour and fodder for livestock.
iv) Performing of social and religious functions.

There are 4648 primary credit societies in Vidardha region. Out of the total credit societies only 2.87% credit societies are found in Gadchiroli districts where a nearly 17.24% region's primary credit societies were observed
in Akola. Below 35% loan recovery was observed in Nagpur, Akola, Bhandara and Amravati districts in 2000. Above 50% loan recovery was noticed in Yavatmal, Chandrapur and Gadchiroli districts in 2000. It means that there is a serious problems of debt in study region.

13) Lack of Sufficient Training and Research Centres:

Table 3.9 indicates that literacy percentage was below 30% in Gadchiroli, Bhandara, Chandrapur, Whereas it was about 30% to 46% in the remaining districts in 1971. During 2001 it was about 74.06% to 84.15% in all districts except Gadchiroli where only 60.29% population was literate. Even then sufficient and advanced training of agriculture is essential to the farmers. Rural area's farmers do not have sufficient knowledge of agriculture. There is one Agriculture University in Akola and 21 training centres in Vidarbha region which provides training facilities to the study region. Shevgaon, Buldhana, Karanja, Babhulkhed, Chandur railway, Achalpur, Wardha, Darvha, Pandharkawada, Lasnapur, Jam, Gaunkheri, Nagpur, Dongargaon, Sakli, Pahela, Chunala, Maldongari, Sonapur and Aheri are the training centres in study region. These 21 centres are unable to train the all farmers of the study region.

14) Problem of Agricultural Labour:

Agricultural Labour is provided mostly by economically and socially backward section, from the tribes also swell their ranks. It may be divided into four types. a) Landless Labourers who are attracted to the lands. b) Landless labourers who are personally independent but who work exclusively for others. c) Petty farmers with tiny bits of land who devote most of their time working for others. d) Farmers, their sons and other dependents in the family work together in their our farmers for their prosperity.

The living conditions of agricultural labour households continue to be pathetic. The proportion of labour households with monthly per capita expenditure of less than Rs. 400 was about 70% which clearly shows that vast
majority to the agricultural labour households are below the poverty line. The following are the important reasons which explains low wages and poor economic conditions of agricultural labour.

i) Low social status.

ii) Paucity of non-agricultural jobs in the study region.

iii) Unorganized labour.

iv) Seasonal employment.

15) Large Diversity of Crops:

Vidarbha regions agriculture is predominantly characterised by the cultivation of a wide variety of food and non-food crops throughout the region except Bhandara district and some parts of Buldhana, Akola, Amravati districts. Due to the differences in soil and climatic conditions different varieties of crops are grown which includes rebi cereals and kharif cereals, pulses and oilseeds. Areas of high diversification was recorded in Buldhana, Akola, Wardha, Nagpur and Chandrapur districts whereas areas of moderate diversification was registered in Gadchiroli, Amravati and Yavatmal districts during 1995-2000. Area of low diversification was found in Bhandara during 1995-2000.

16) Lack of Marketing System:

There are 97 main regulated markets in the study region. Gadchiroli and Wardha districts are having four and seven main markets each in 2000-2001. There are 164 sub markets in study region, out of which only six sub-markets in Bhandara whereas Nagpur district is having twenty eight markets. Below 0.016 to 0.020 main regulated markets per 1000 hectare were found in Buldhana, Akola, Amravati, Wardha and Nagpur districts while above 0.20 main regulated markets were observed in remaining districts during 2000-2001.

About 0.016 to 0.053 density of sub-markets per 1000 hectares was observed in all districts during 2000-2001. The number of regulated and
sub-markets are not sufficient to fulfil the requirements of the study region’s farmers. Even study region’s farmers do not get expected price of their commodities in local markets. All of the regulated markets do not have sufficient facilities like water supply, godowns and other facilities.

17) Low Price of Agricultural Commodities:

Till today the Government has been fixing foodgrains prices of “slightly higher than the areage of immediate post - harvest prices during the previous three years.” This principle of fixing of prices of agriculture commodities is indeed wrong as the immediate post-harvest prices are nothing but distress prices and if these are to be fixed to the whole year it would act as a disinintensive to the farmer who has to invest more to so as to produce more. The well to do farmers on whom the main responsibility for increasing production rests have been in the habit of getting much higher prices by holding on to their surplus stocks till the lean season.

Nearly 65% to 70% farmers of the selected villages told that they are not getting sufficient market price. Govt. of Maharashtra is giving Rs. 2300/- per quintal for cotton and that price is not sufficient. Sugar industries are giving Rs. 560 to 700/- for per metric tonnes. This price is also insufficient for the farmers. The farmers gets their prices of cotton by two or three installment. That amount of cotton did not received at proper time, hence, the farmers have to face economic problems. Some times they take private loan from moneylenders to fulfill their needs. The high labour rates, costly chemical fertilizers, uncertainty for rainfall, high electric charge, high transportation cost, due to these reasons production cost of every agricultural produce is more. Therefore, the price of agricultural produce is a serious problem in the study region.

8.4: Suggestion:

1) Untimely and Unequal Distribution of Rainfall:

To solve this serious problem micro- level planning should be done for
crop system on the basic of ecology consideration of every tahsil. It is necessary to identity the best cropping patten for every lacaal area under the prevailing rainfall and temperature pattern. Most of the irrigated wells have insufficient water facilities during late summer and early monsoon period, hence, efficient utilization of water in needed. Minimal irrigation for field crops need to be adopted. Each and every drop of rain water should be percolated in the soil and extra running water should collect in percolation tanks. Drip irrigation system for horticultwual crops for optimising water resources and need to be followed. Various percolation tanks, Kolhapur type bandhare's should be prepared in every tansil of the Vidarbha region.

Every tahsil of the study region might select an area where communications can be so arranged that it is possible for the weather for cast to reach the cultivators on the same day that it could be used. This observation could then be made general so that this Knowledge helps the farmer in timing his agricultural operitions.

2) Soil Erosion:

In general term soil erosion in caused by water running over the surface of the ground. Soil conservation therefore, means either decreasing or diverting the run-off or both. "Soil conservation in its widest sense includes not only control over erosion but all those measures like correction of soil defects, application of manures and fertilizer, proper crop rotation, irrigation etc. which aim at maintaining the productivity of the soil at higher level."

The very shallow soils and the shallow soils depth have poor water retention capacity, poor fertility and they are vulnerable to run-off and soil erosion. As such these soils need to be diverted to grasses, agro forestry, dry land horticultural crops. The following methods should be adopted to control the soil erosion of the Vidarbha region.

i) Terrace Control Runoff and Reduce Soil Erosion:

One of the most common method of reducing runoff velocity is to break
a slope by terracing. This method should be adopted in Gavilgarh hills, Narnala, Ajanta range, Eastern hilly region, Piedmont region, Arvi uplands and Ramtek uptand regions.

ii ) **Contour Cultivation** :

Ploughing along the runoff on the sloping land reduces considerably the soil loss by erosion and the total runoff increasing there by the crop yield. This method is applicable to reduce the soil erosion of hilly region of the Vidarbha.

iii ) **Crop Rotation** :

The farmers should take the crops by rotation. This method should have follow in the wainganga, painganga river basins. Crop rotation should carried out for the following reasons.

a) To maintain productivity and yields.

b) Systematic farming.

c) It helps to control weeds, insect, pests and plant diseases.

d) It helps in maintaining organic matter and nitrogen.

iv ) **Keeping the Soil Covered** :

This method should be adopted in hilly areas and river basins.

v) **Increased Use of Manures** :

Use of compost fertilizer and chemical fertilizer should be increased in every tahsil so that soil fertility can be increased in near future.

3) **The Problem of Sub - Division and Fragmentation of Holding** :

The prevalence of sub-divisions and fragmentation is a tremendous hindrance in the use of improved agricultural practices, such as high yielding seeds, chemical fertilizer, use of tractors, construction of wells, fencing of land etc.

**Remedies for Sub-Division and Fragmentions** :

One of the important aspect of land reforms in the Vidarbha region is
the increase in the size of the holding and the consolidation of scattered holding in Gadchiroli, Chandrapur, Yatmal, Bhandhara, Buldhana, Amaravati, Buldhana, Wardha and Amaravati districts. To establish economic holding the following important measures will have to be adopted:

a) The fixation of ceiling on holdings, so that all those who have more than the prescribed maximum limit in a village have to surrender their surplus land to the public authorities who will then distribute the same who have un economic holdings.

b) Small patches of the land should be consolidated into large land in the study region.

c) The population pressure on land may be reduced by starting of industries in rural areas to provide employments to the landless labourers and marginal peasants.

d) The population pressure on land may be reduced by controlling population growth rate on the large scale in the study region.

4) Problem of Regional Imbalances:

There is a problem of regional imbalance in agricultural development in Vidarbha region. To solve this problem Govt. of maharashtra should give more funds to the backward districts of the Vidarbha region. It is necessary to test soils of the backward area and the farmers should have given adequate knowledge of modern technology so that they can develop the agriculture.

More funds should be sanctioned for constuction of irrigation wells, tanks etc. New training centres must be started in backward tahsils of the Vidarbha region: Roads, railway routes, co-operative banks these facilities must be developed in backward tahsils of the Vidarbha region.

5) Lack of Irrigation:

Water is one of the primary requirement for the success of agricultural
productivity. But even today there is problem of irrigation in Buldhana, Akola, Amravati, Yavatmal and Wardha districts. To solve this problem the following strategy should be adopted in every mentioned districts.

a) The command Area Development Programme in each tahsil being made a more effete instrument for ensuing speedy transition to irrigated agriculture and optimum use of water.

b) Installation of sprinkler and drip irrigation systm in water scare and drought prone areas and encouragement to surface water and lift irrigation.

c) Greater user participation in major, medium and minor irrigation projects is being encouraged both at the system level and at local level.

d) Study region’s farmers by and large lack in the necessary knowledge to optimise irrigation use. In this connection it is necessary to provide better extension services suitably linked with research organization of scientists and adopted to multi-cropping farming practices.

e) The Government should encourage repair and improvement of minor irrigation tanks as well as the development of new works as a part of the integrated micro development projects.

6) Problem of Soil Fertility Index:

To solve this problem the following strategy should be adopted in every block of the Vidarbha.

i) It is necessary to provide better extension services suitably linked with research organization of scientists and adopted to multi cropping farming practices.

ii) Initially studies on physico-chemical characteristics of the soil, drainage characteristics should follow appropriate irrigation methods and use adequate manures for the various crops.

iii) The farmers should have motivated about the application of chemical fertilizers, compost fertilizers and pesticides on large scale.
iv) It is necessary to start soil testing centres at tahsil as well as at big village level in the entire Vidarbha.

7) Discouraging Rural Atmosphere:

Economic condition of the farmers varies form tahsil to tahsil. Most of the farmers of the selected villages are illiterate, poor and ignorant. They are using old agricultural implements. Now a days this condition is changing very fast in the study area. It is necessary to change this condition through television programmes, radio programmes and Government efforts. The application of new improved seeds, fertilizers and use of pesticides etc. The percentage of literacy should be increased in dry area of the region. More and more training centres should be start in the study region.

8) Agricultural Implements and Machinery:

Most of the farmers of the study region are using out moded agricultural implements. Wooden ploughs were dominant in Amravati, Yavatmal, Nagpur, Bhandara, Chandrapur and Gadchiroli districts on the other hand iron ploughs was dominant in remaining districts in 1997. Table 3.11 indicates that number of wooden ploughs and iron ploughs increased by more than one and half times from 1972 to 1997. Farmers are poor and tradition bound hence, they are unable to adopt new advanced machinery.

The farmers should have motivated to use small pump sets, hoes, seed drills and fodder cutters. Increase in production is possible if proper machineries are used. The rural banks co-opertive banks, and land developement banks should have given more loans and subsidies to the poor farmers.

9) Problem of Plant Protection:

No area was observed under cotton in Bhandara and Gadchiroli district during 1970-75 and 1997-2000. Below 10% net sown area was recorded in Nagpur whereas 30% to 45% net sown area was recorded under cotton in Chandrapur, Amravati, Wardha, Akola, Yavatmal and Buldhana districts.

The pests and diseases occurs, during the various stages of growth of a plant. In the case of disease, preventive measures and curative measures have to be taken, generally at the sowing stage. Both these measures assume a routine character and can be taken by the ordinary field staff with some previous training. Introduction of resistant varieties of crops, changes in rotation time of sowing or planting deep and shallow cultivation, giving or with holding of irrigation are the useful methods. The farmers should have given knowledge of plant diseases and use of pesticides through orientation programmes, radio programmes and television programmes.

10) Less Use of Chemical Fertilizers:

Use of chemical fertilizer increased in every disirict. Chemical fertilizers increased by 6.49 times between 1984-85 and 2000-2001 in the study area. In any scheme for boosting agricultural output, the use of chemical fertilizers has an important role. The fertility of region’s soil is deteriorating steadily on account of manure. Organic waste materials like stubles and red gram stalkes can profitably be used as mulch during the rubi season. Phosphorus and zinc are found to be the most deficient elements in the soils of the region.

It is necessary to distribute chemical fertilizers to the poor farmers without charging any amount by the state government. The farmers should have given proper training regarding the use of chemical fertilizers.

11) Less Use of High Yielding Variety Seeds:

Use of high yielding variety seeds increased from 58587 metric tonnes to 108786 metric tonnes between 1984-85 and 1999-2000. Even then agriculture in the study region suffers from the application of inadequate and bad seeds. Usually seeds are laid added and kept unprotected for next sowing season. A number of high yielding varieties of rice, jowar, maize, tur, bajara etc have been introduced.
It is necessary to knowledge of high yielding variety seeds to the farmers of Vidardha region. Govt. of Maharashtra should distribute HYV seeds to the poor farmers through primary credit societies.

12) Problem of Indebtedness:

Below 35% loan recovery was recorded in Nagpur, Akola, Bhandara, Amravati districts and 35% to 50% loan recovery was recorded in Buldhana and Wardha districts during the period of investigation. Above 50% loan recovery was noticed in Yavatmal, Chandrapur and Gadchiroli districts.

The problem of rural indebtedness has two aspects and therefore, the solution is also two-fold. In the first instance, measures may be devised for cancelling old debts. Secondly, measures should be devised to see that fresh borrowing is limited to the minimum necessary and to the productive type. At the same time it is necessary to control the more lander and regulate his activities. It is essential to stop moneylender practice in the rural areas. Co-operative bank should have given sufficient loan to the poor farmers at the lower rate of interest.

13) Lack of Sufficient Training and Research Centres:

There are only 21 training centres in entire Vidarbha region. These centres are not sufficient to provide proper and adequate training to the farmers of Vidardha region. At least there should be 119 training centres because there are 119 tahsils in Vidarbha region. If training centres will start at every tahsil places, they will work lot for testing of soil, arranging seminars etc. The following workshops and training programmes should be organised in the region:

i) Training of subject matter specialities and dryland horticulture.

ii) Training on pest surveillance.

iii) Training on identification of pests and diseases and plant protection measures.
iv) Training on water management.

v) Training on pulses and oilseeds production.

vi) Training on production technology.

vii) Monthly workshop: Monthly workshop should be organised to give the knowledge of agriculture to the farmers.

viii) Krishi Vigyan Kendra should be started in every tahsil. These kendras will give training to the farmers.

ix) Pre-season workshops must be organised for two days, twice in a year before the commencement of kharif and rabi season in every tahsil.

14) Problem of Agricultural Labour:

There is problem of agricultural labour in the study region. This problem is more aggravated in recent years because of the migration of workers from rural areas to urban places for the search of better job opportunities. The wages of agricultural labourers ranges from Rs.40/- to Rs.60/- in the selected villages. It varies from village to village in the entire study region. The wages of agricultural labourers should be increased so that they use their full capacity to the agriculture. The economic condition of the farmer is very poor. The following suggestions should have been adopted to improve the economic condition of the labours.

i) Removal of serfdom.

ii) Better implementation of minimum wages in agriculture.

iii) Peasant unions for agricultural labour.

iv) Rehabilitation of landless agricultural labourers.

15) Large Diversity of Crops:

There is large diversity of crops in all districts of the study region. Even large diversity of crops is also observed in every selected village. To solve this crucial problem the following measures should be adopted.

i) It is essential to increase irrigated area in the study region. If the irrigated area will be increased ultimately there will specialization of crops.
ii) The farmers should have given knowledge of specialized crops.

iii) The farmers should adopted modern techniques of agriculture.

iv) To acquire the knowledge of specialization of crops, the farmers must be educated. Therefore it is necessary to increase the rate of literacy in rural areas.

v) Govt. should have take initiative steps in this regard.

vi) Various workshops and seminars must be arranged for the farmers regarding the specialization of crops.

16) Lack of Marketing System:

There are 97 main regulated markets and 164 sub-markets in the study region. There are only four markets in Gadchiroli and seven in Wardha district. Number of markets per 1000 hectares is very low. Hence, the farmers do not get proper price of their commodities in the regulated markets. The role of baniya should be in favor of the farmers. In order to have best advantage in marketing of his agricultural produce the farmer should enjoy certain basic facilities.

i) He should have proper facilities for storing his goods in the premises of the regulated markets.

ii) The farmers should have clear information regarding the market condition as well as about the surplus prices, otherwise he may be cheated.

iii) There should be organised markets where the farmers will not be cheated by the dalals and arhatiyas.

iv) The number of baniya should be as small as possible so that the middlemen's profits are reduced. This increase returns to the farmers.

v) He should have adequate and cheap transport facilities which would enable him to take his surplus produce to the mandi rather than dispose it in the village itself or to village moneylenders at low price.

vi) Government should have fixed the prices of cereals, pulses and oil
seeds so that the farmers will get more price in the market.

vii) The government should have built warehouses in the jurisdiction of regulated markets as well as in the rural areas so that the farmers can dump their agricultural goods for specific periods.

17) Problem of Low Productivity:

Generally crop productivity of all crops are very low except cotton and rice in all districts. In some parts of Buldhana, Yavatmal, Wardha even cotton and rice productivity is also less. To solve the problem of low productivity the following measures should be adopted.

i) Compost fertilizer should be used on large scale in every district.

ii) More and more farmers in rural areas should be encouraged to use improved seeds.

iii) Agricultural productivity can be increased by applying new farm technology and advanced agricultural implements in the study region.

iv) It is necessary to increase irrigated area in the dry part of the study region.

v) The farmers should have motivated to use fertilizers on large scale to their farms. Use of fertilizer can push up the productivity manifold.

vi) Those farmers who have extremely small holdings may be induced to give up their land and to shift other occupations in rural areas.

vii) The commercial banks, rural banks, land development banks and primarily credit societies should have given maximum loan advances at low rate to the poor farmers.

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