The Pharma Innovation Journal 2022; SP-11(4): 1340-1344

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(4): 1340-1344

www.thepharmajournal.com
Received: 19-02-2022
Accepted: 21-03-2022

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An appraisal of land use and cropping pattern in Solapur district of Maharashtra

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Abstract
The paper examines the structure and nature of land use, cropping pattern, crop diversification, crop concentration, productivity level based on the secondary data collected for the three periods ie. 1988-90, 2001-003 and 2014-16. The data was collected from different published sources such as socio economic survey of Solapur district, other surveys related to livestock population, forest area in district. For this study have selected three periods. Among this Periods, 1988-90 was considered as base period. Comparative study between three periods had done. The data was obtained on the land use and cropping pattern were analysed by simple tabular method. The study has revealed that the Solapur district experiencing a lateral movement towards crop specialization and crop diversification. The investigation revealed that area under forest was decreased by 1.68 per cent during the study period. It showed non-significant change during the study period. Land under non-agricultural use was decreased to 27886 hectares which showed a decrease of 57.96 per cent over the base period. The study has identified the major determinants of agricultural productivity in Solapur district and has suggested some policy measures for increasing agricultural productivity in the state.

Keywords: Land use pattern, cropping pattern, crop diversification, Solapur

Introduction
Solapur district, which seems to be Agro-climatically representative of western Maharashtra, has been purposively selected for present study. The Solapur is situated in south-east edge of Maharashtra. There was that the finding of the study may, indicates the overall trend of agriculture in western Maharashtra. Therefore, the Solapur district has specifically selected for present study. The farmers in the district agriculturally conscious and have made sincere efforts for agricultural development since the inception of green revolution in the country. The district is bounded by Ahmednagar Solapur district is geographically one of the largest District in Maharashtra State. It is well defined to its west as well as to its east by the inward looking scraps of Phaltan ranges and Osmanabad plateau respectively. There are no prominent hill ranges in the district. The western foot hill regions in the parts of Malshiras and western Sangola. It is one of the identified 72 drought prone districts in India. Solapur district occupies 4.83 per cent of area and contains 4.10 per cent of population of Maharashtra State. The total Geographical area of solapur is of 15.055 lakh ha. Gross cropped area is near about 11.77 lakh ha. The net sown area of the district is of about 9.90 lakh ha. (i.e. 65.76%). Cropping intensity is 118.93 per cent, the forest area is 33100 ha. (2.19%). It is believed that agricultural development in a specific region cause significant changes in the land use and cropping pattern due to rational attitude of the farmers to make investment in land development and to allocate their resources for high rewarding enterprises.

Materials and Methods
The data obtained on the land use and cropping pattern of Solapur district for the twenty-seven years divided into three periods as 1988-90, 2001-003 and 2014-16 were analysed by simple tabular method. The proportions were estimated for each of the above periods to know the changes in the land use, cropping pattern and input use of district over the period under study. The changes in the land use, cropping pattern and input use were also depicted graphically.

Results and Discussion
1. Land use pattern of Solapur
To have a brief idea about the mode of agriculture in the district, the land use and cropping

pattern in respect of Solapur district for the latest year ie. 2016-17 is explained. The information regarding the land use pattern of Solapur district is depicted in Table. 1.

Table 1: Land use pattern of Solapur (2016-17) (Area in '00' hectares)

Sr. No.	Particulars	Area	Percentage to the total geographical area
1.	Total geographical area	15055.00	100.00
2.	Area under the forest	353.00	2.34
3.	Barren and uncultivated land	637.00	4.23
4.	Land put to non agricultural use	520.00	3.45
5.	Permanent pastures and grazing land	661.00	4.39
6.	Area under orchard and miscellaneous trees	60.00	0.39
7.	Cultivable waste	394.00	2.61
8.	Other fallow land	1622.00	10.7
9.	Current fallow land	1611.00	10.70
10.	Net sown area	9197.00	61.08
a.	Irrigatedarea	2410.00	16.00
b.	Un-irrigatedarea	6787.00	45.08
11.	Area sown more than once	1028.00	6.82
12.	Gross cropped area	11225.04	67.91
13.	Intensity of cropping (%)	122.05	

Source: Socio- Economic Review and District Statistical Abstract of Solapur, 2017-18

It is observed from Table 1 that, the total geographical area of the district was 1505500 hectares. The net sown area for the year 2016-17 was 919700 hectares which formed 61.08 per cent of total geographical area. The gross cropped area was 1122504 hectares and the intensity of cropping was 122.05 per cent.

The information about changes in land use pattern is presented in the Table 2. By studying the table, it is revealed the comparison between three periods *viz.*, First period- 1988-89 to 1990-91, second period- 2001-02 to 2003-04 and third period- 2014-15 to 2016-17. The area under forest was 33666 hectares i.e. 2.23 per cent of total geographical area in 1988-89 to 1990-91, which was decreased to 32000 hectares in 2001- 2003, i.e. it showed decrease by 4.94 per cent over the base year.

Table 2: Changes in land use pattern of Solapur

Sr. No.	Particulars	1988 to 90 (Base period)	2001 to 2003	2014 to 2016	Per cent change in land use pattern over the base year	
					2001-003	2014-16
1.	Geographical area	15055 (100)	15055 (100)	15055 (100)	-	-
2.	Forest area	336.66 (2.23)	320.00 (2.12)	331.00 (2.19)	-4.94	-1.68
3.	Barren and uncultivable land	703.33 (4.67)	630.00 (4.18)	634.93 (4.21)	-10.42	-9.72
4.	Land under non-agricultural use	663.33 (4.40)	360.00 (2.39)	278.86 (1.85)	-45.72	-57.96
5.	Cultivable waste land	486.66 (3.23)	340.00 (2.25)	355.26 (2.35)	-30.13	-27.00
6.	Permanent pastures	600.00 (3.98)	380.00 (2.53)	453.66 (3.01)	-36.66	-24.39
7.	Land under orchard and Miscellaneous trees	43.33 (0.28)	50.00 (0.33)	46.66 (0.30)	15.39	7.68
8.	Current fallow	830.00 (5.51)	1930.00 (12.81)	1611.00 (10.70)	132.53	94.09
9.	Other fallow	385.00 (2.55)	1401.00 (9.30)	1622.00 (10.77)	263.89	301.90
10.	Net sown area	10653.33 (70.8)	9774.66 (64.92)	9900.6 (65.76)	-8.24	-7.06
a.	Irrigated area	1233.33 (8.19)	2440.00 (16.20)	1645.00 (10.92)	97.83	33.37
b.	Un-irrigated area	9420.00 (62.57)	7334.66 (48.71)	8255.6 (54.83)	-22.13	-12.36
11	Area sown more than once	3476.66 (23.09)	1512.00 (10.043)	1159.33 (7.70)	-56.50	-66.65
12	Gross cropped area	11446.66 (76.03)	10143.33 (67.37)	11775.01 (78.21)	-11.38	2.86
13	Cropping intensity (%)	107.44	103.77	118.93		

Source: Socio- Economic Review and District Statistical Abstract of Solapur, 1990-91 to 2017-18.

Area under forest was 33100 hectares in 2014-2016. It recorded decrease of 1.68 per cent over the base year. It showed non-significant change during the period under study. The decrease in area under forest may be due to the problems like industrialization, population growth. There is not desirable change for maintaining ecological balance in Solapur district. But area under forest is increased to 353000 hectares in 2016-17 due to increasing tree plantation programmes taken under government programmes. Barren and uncultivable land decreased from 70333 hectares to 63493 hectares in study period. It is decreased by 9.72 per cent over the base period. Land under non-agricultural use was decreased to 27886 hectares in study period. It was decreased by 57.96 per cent over the base period. It was decreased due to more area had taken under cultivation. Because area under high yielding varieties and cash crops like sugarcane was increased in study period. The area under cultivable waste land showed slight decrease, it was 48666 hectares in base period and 35526 hectares in III period. i.e. 2.35 per cent of the total geographical area. There is need to minimize the cultivable waste land. The area under permanent pastures decreased by 24.39 per cent over the base period and land under miscellaneous trees increased over a period. Permanent pastures land decreased from 60000 hectares to 45366 hectares in study period. The proportion of permanent pastures to the total geographical area was 3.01 per cent. Area under permanent pastures decreased from 19890-91 to 2003-04 and it was increased from 2003-04 to 2016-17. This showed a decrease of 24.39 per over the base period.

The current fallow land was 83000 hectares which contributes 5.51 per cent share in the total geographical area in period 1988 to 1990, which was increased to 193000 hectares in 2001 to 2003 (12.81 per cent of gross cropped area) and again it was increased to 161100 hectares in 2014 to 2016 i.e. 10.70 per cent of total geographical area. As compared with the base period it was increased by 94.09 per cent. It may be due to low rainfall, area under cultivation was decreased and also due to mono-cropping systems for taking commercial crops. The net sown area was 1065333 hectares i.e. 70.8 per cent of total geographical area in Base period, which had declined to 977466 hectares, i.e. 64.92 per cent in II period, and later on it also decreased to 990060 hectares. It was 65.76 per cent of total gross cropped area in III period. However, there was decrease in net sown area over the base year i.e. by 7.06 per cent. This was indicated that, the cultivated area might be shifted towards land under non-agricultural use. On detailed examination of the net sown area, the un-irrigated area showed significant decline from 62.57 per cent to 54.83 per cent of the total gross cropped area. Where as, irrigated area was increased from 123333 hectares i.e. 8.19 per cent to total gross cropped area to 244000 hectares i.e. 16.20 per cent during the study period.

This showed that the dry area declined by 12.36 per cent while the irrigated area increased by 33.37 per cent during the study period. The area sown more than once decreased during II and also in III period. The gross cropped area was 1144666 hectares, (76.43%) which indicated that there was significant decrease to 1014333 hectares (67.37%) in 2001 to 2003 and finally showed increase in 2014 to 2016, which was 1177501 hectares (78.21% of GCA) which showed 66.65 per cent increase over the base period. The intensity of cropping which was a measure of land use efficiency did show increase during period from 1988-90 to 2014-16. However, it was decreased during the period 2001-2003 as compare to base period. It had increased from 107.44 to 118.93 per cent over the base year. The change in the major components of the land use pattern during the study in Solapur district had graphically presented in Fig 4.4. To sum of whole, it could said that the area under forest, the land under cultivable waste were decreased and area under current fallows showed increasing trend during the study period. However, there was decrease in net sown area by 7.06 per cent over the base year but irrigated area was increased by 33.37 per cent over the base period.

Thus, it was stated that, there was an expansion in irrigated area directed towards commercialization of agriculture due to agricultural development in Solapur district was partially proved.

2. Changes in Cropping Pattern of Solapur

The details related to the changes in cropping pattern of Solapur district is presented in the Table 3. It seems from the Table 3, that the area under paddy decreased from 7066 hectares in period I-1988 to 1990 to 266 hectares in period III- 2014 to 2016. The area under wheat was increased from 46300 hectares in period I to 47200 hectares in period III. It was 4.04 per cent to gross cropped area in Period I where as it was 4.00 per cent of the gross cropped are in Period III. It was showed an increase about 1.94 per cent over the base period. The area under *rabi* jowar showed decreasing trend in area. Area decreased from 760116 hectares in base period to 722333 hectares in period III and also in period II. It showed decrease of 5.77 per cent in period II and 4.97 per cent in period III over the base period. Decrease may be due to low rainfall in the district. The area under bajra showed slight decrease in period III but there was drastic decrease in area during period II over base year. The area under maize had increased by 98.24 per cent over the base year. Total cereals showed decreasing trend in area in period III over the base year. The area under total cereals was 873505 hectares in base period and it was decreased to 823331 hectares in period III. It recorded 5.74 per cent decrease over the base year. Area under gram was 29966 hectares in base period and it was increased up to 47266 hectares in period III. That was showed 57.73 per cent increase over the base year. Area under red gram is decreased from 39100 hectares to 22322 hectares in the study period.

Table 3: Changes in Cropping pattern of Solapur (Area in '00' ha)

Sr. No.	Particulars	1988 to 1990 (Base period)	2001 to 2003	2014 to 2016	Per cent change over the base year	
					2001-2003	2014-2016
1.	Paddy	70.66 (0.61)	24.33 (0.23)	2.66 (0.02)	-65.56	-96.23
2.	Wheat	463.00 (4.04)	509.66 (5.02)	472.00 (4.00)	10.07	1.94
3.	*Kharif* jowar	98.66 (0.86)	38.33 (0.37)	2.33 (0.01)	-61.14	-97.63
4.	*Rabi* jowar	7601.16 (66.40)	7162.33 (70.61)	7223.33 (61.34)	-5.77	-4.97
5.	Bajara	292.33 (2.55)	155.33 (1.53)	157.33 (1.33)	-46.86	-46.18
6.	Maize	188.66 (1.64)	216.66 (2.13)	374. (3.17)	14.84	98.24
7.	Other Cereals	20.28 (0.17)	18.66 (0.18)	1.66 (0.01)	-7.98	-91.81
8.	Total Cereals	8735.05 (76.31)	8125.3 (80.10)	8233.31 (69.92)	-6.98	-5.74
9.	Gram	299.66 (2.61)	305.00 (3.006)	472.66 (4.01)	1.78	57.73
10.	Red Gram	391.00 (3.41)	192.33 (1.89)	223.22 (1.89)	-50.81	-42.91
11.	Green Gram	27.00 (0.23)	16.00 (0.15)	48.40 (0.41)	-40.74	79.25
12.	Black Gram	13.00 (0.11)	32.66 (0.32)	94.60 (0.80)	151.23	627.69
13.	Other Pulses	4.49 (0.039)	6.8 (0.06)	5.14 (0.04)	51.44	14.47
14.	Total Pulses	735.15 (6.42)	552.79 (5.44)	844.02 (7.16)	-24.80	14.80
15.	Total Food grains	9470.2 (82.73)	8678.09 (85.55)	9077.33 (77.08)	-8.36	-4.14
16.	Groundnut	542.00 (4.73)	248.33 (2.44)	48.00 (0.40)	-54.18	-91.14
17.	Sunflower	689.66 (6.02)	226.00 (2.22)	169.33 (1.43)	-67.23	-75.44
18.	Safflower	94.66 (0.82)	149.66 (1.47)	24.66 (0.20)	58.10	-73.94
19.	Soybean	8.00 (0.06)	5.66 (0.05)	160.66 (1.36)	-29.25	`1908.25
20.	Other Oilseeds	60.4 (0.52)	14.83 (0.14)	1.33 (0.011)	-75.44	-97.79
21.	Total Oilseeds	1394.72 (12.18)	644.48 (6.35)	403.98 (3.43)	-53.79	-71.03
22.	Fruits	46.92 (0.40)	13.70 (0.13)	43.1 (0.366)	-70.80	-8.14
23.	Vegetables	83.18 (0.72)	10.24 (0.10)	23.84 (0.20)	-87.68	-71.33
24.	Sugarcane	364.33 (3.18)	649.33 (6.40)	1473.72 (12.51)	78.22	304.50
25.	Cotton	22.66 (0.19)	31.66 (0.31)	8.00 (0.06)	39.71	-64.69
26.	Fodder Crops	49.19 (0.42)	99.83 (0.98)	743.62 (6.31)	102.94	1411.7
27.	Medicinal and aromatic plants	14.8 (0.12)	16.00 (0.15)	1.42 (0.012)	8.10	-90.40
28.	Gross Cropped Area	11446.66 (100)	10143.33 (100)	11775.01 (100)	-11.38	2.86

Source: Socio- Economic Review and District Statistical Abstract of Solapur, 1990-91 to 2017-18

It showed a decrease of 42.91 per cent over the base period. In, area under black gram and green gram had increased over base year but area under green gram had decreased in period II. The area under green gram had increased from 2700 hectares to 4840 hectares in the study period. It showed 79.25 per cent increase over the base period. The area under black gram was 1300 hectares in base period and it was increased to 9460 hectares in study period. It was recorded an increase of 627.69 per cent over the base period. The area under total pulses was increased from 73515 hectares in base period to 84402 hectares in period III. It showed 14.80 per cent increase over the base period. Area under total food grains decreased

from 947020 hectares in base year to 907733 hectares in period III. It was decreased by 4.14 per cent over the base period. Area under total oilseeds decreased from 139472 hectares to 40398 hectares during the study period. All oilseeds showed decreasing trend in area over the base period. It recorded 71.03 per cent decrease over the base period. The area under safflower was increased from 9466 hectares to 14966 hectares in period II, later on it was decreased to 2466 hectares in period III. Soybean introduced in the district in 1987 and area under soybean was 800 hectares in base period later on it was decreased to 566 hectares in period II. In last few years it increased to 16066 hectares. It showed an increase of 1908.25 per cent over the base year. Area under sugarcane showed tremendous increase. Area under sugarcane was 36433 hectares in base period and increased up to 147372 hectares in period III. Area under fruits was slightly decresed from 4692 hectares to 1370 hectares in period II and later on it was increased to 4310 hectares due to Maharashtra Government's Orchard planning programme. Area under cotton showed, decreasing trend. It could be seen from the table that the area under sugarcane was increasing but, area under cotton showed decreasing trend.

Conclusion

The following conclusions can be drawn from the findings of the above study.

1. The area under forest declined by 1.68 per cent during the study period in Solapur district. The area under barren and uncultivable land had declined over the period under the study. It was decreased by 9.72 per cent over the base year.
2. The area under cultivable waste land had decreased from 48666 hectares to 35526 hectares over the base period. It showed 27 per cent decrease over the base period. The area under current fallow land increased from 83000 hectares to 161100 hectares during study period.
3. The area under irrigation increased significantly. In the year, 1990-91 irrigated area was 116000 hectares and in the year 2016-17 it was 241000 hectares. The irrigated area increased by 107.75 per cent during the study period, which was an important achievement in the district.
4. The area under wheat and maize had increased significantly. The area under *rabi* jowar, paddy and bajara had decreased during study period. Cereals had predominance in cropping pattern in Solapur district. Under pulses, the area under gram had increased during study period. The consumption of fertilizers (NPK) had increased in study period.

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