Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; Sp 9(5): 671-675
Received: 06-09-2020
Accepted: 15-10-2020

VS Talekar
Department of Agriculture Economics, College of Agriculture, Parbhani, Maharashtra, India

Dr. KV Deshmukh
Department of Agriculture Economics, College of Agriculture, Parbhani, Maharashtra, India

SD Chaudhari
Department of Agriculture Economics, College of Agriculture, Parbhani, Maharashtra, India

Corresponding Author:
VS Talekar
Department of Agriculture Economics, College of Agriculture, Parbhani, Maharashtra, India

Land use and cropping pattern in Solapur district of Maharashtra

VS Talekar, Dr. KV Deshmukh and SD Chaudhari

Abstract
Agriculture is the backbone of Indian economy. It has been the livelihood of the Indian people since ancient times, and is still the largest source of livelihood for the Indian people. Agriculture sector which employs more than 50 percent of the total workforce in India and contributes around 17-18% to the country's GDP. The economic contribution of agriculture to India's GDP is steadily declining with the country's broad-based economic growth. Many efforts had been taken for improving the agriculture situation in India. To increase the production by adopting new improved technology for that initiate the Five Year Plans from 1950-51. It has given priority for agriculture sector and paid attention purposively in each plan towards agriculture development.

Keywords: Agriculture, land use, cropping pattern, crop intensity etc.

Introduction
Agriculture is the backbone of Indian economy. It has been the livelihood of the Indian people since ancient times, and is still the largest source of livelihood for the Indian people. Agriculture sector which employs more than 50 percent of the total workforce in India and contributes around 17-18% to the country's GDP. Irrigation is the key factor in agricultural development. The factor use of modern inputs ultimately results in increase of productivity. The area under Surface irrigation and other than the well was decreased from 915.00 hectares to 855.00 hectares i.e. -6.56 per cent from the year 2003-04 to 2017-18. At the same time the area under well irrigation was increased from 1585.00 to 1643.00 hectares i.e. 3.66 per cent. The proportion of net irrigated area to net area sown has decreased from 27.22 per cent to 23.98 per cent. The proportion of gross irrigated area to gross cropped area has decreased from 30.12 per cent to 23.55 per cent during 2003-04 to 2017-18.

Objective
These paper aims to evaluate changing land use, agriculture cropping pattern and crop intensity and to examine land use change in Solpur district during the 2003 - 2018

Database and methodology
Since the major objective of the study is to examine the development of agriculture in Solapur District during last 15 years. A time series data are necessary to study the growth rate of selected parameters. Such data can be available only through secondary sources. The required secondary data will be obtained from the different records of state governments and co-operative institutions viz. Department of Agriculture, Government of Maharashtra, Socio-economic Review, Directorate of Economics and Statistics, Government of Maharashtra.
For studying the growth rate in area, production and productivity of major crops, linear growth rate will be estimated by using following linear functions.

$$Y= a+bx+e$$

Where,
Y = Dependent variable for which growth rate is estimated
a = Intercept/Constant
b = Regression/trend coefficient
x = period in years
e = error term with zero mean and constant variance.

Compound growth rate of area, production, productivity were worked out to know the percentage increase or decrease in selected parameters. The exponential growth function of this type was used purposively.

$$Y = a.b^x$$

Where,
Y = Dependent variable for which growth rate is estimated
a = Intercept or constant
b = Regression/ trend coefficient
x = period in years
b = (1+r)
r = is compound growth rate

Solapur District will be purposively selected for present study because Solapur district has made progress in Agricultural development due to increase of irrigation facilities through major irrigation dam via. Ujani dam.

Study Area

Geographically Solapur is located between 17.10 to 18.32 degrees north latitude and 74.42 to 76.15 degrees east longitude. The district is situated on the south east fringe of Maharashtra State and lies entirely in the Bhima and Seena basins. Whole of the district is drain either by Bhima river or its tributaries. The district is bounded on the north by Ahmednagar and Osmanabad districts, on the east by Osmanabad and Gulbarga (Karnataka State) districts, on the south by Sangli and Bijapur (Karnataka State) and on the west by Satara and Pune districts. There is no important hill system in the district. Only in the north of Barshi Taluka several spurs of Balaghat range pass south for a few kilometers. There are also a few scattered hills in Karmala, Madha and Malshiras Talukas. The district in general has flat or undulating terrain. The low table land and small separate hills in Karmala and Madha Talukas act as a Watershed between Bhima and Seena rivers The district covers geographical area of 14844.6 sq.kms. which is 4.82% of the total area of Maharashtra State. Out of the total area of the district 338.8 sq.kms (2.28%) is Urban area whereas remaining 14505.8 sq.kms. (97.72%) is Rural area. Area wise Karmala taluka is biggest covering an area of 1609.7 sq.kms and North Solapur is smallest covering an area of 736.3 sq.kms.

Solapur tehsil map

Land Utilization Pattern

Area under barren and uncultivable land was increased from 4.23 per cent to 4.87 per cent during the period 2003-04 to 2017-18. The percentage change was 15.08 percent. Land under non agricultural use was increased from 150.00 to 160.00 hectares during the period of 2003-04 to 2017-18, i.e. 1.0 to 1.07 per cent of total geographical area and the percentage change was 6.67 per cent. The land under the cultivable waste was increased from 340.00 to 387.00 hectares during the same period i.e. 2.28 to 2.60 per cent. The percentage change was 13.82 per cent.

Table 1: Changes in land use pattern of Solapur district

Sr. No.	Particulars	2003-2004	2017-2018	Percentage Change
1	Geographical area	14878 (100)	14878 (100)	00
2	Forest	320 (2.15)	353 (2.37)	10.31
3	Barren and uncultivable land	630 (4.23)	725 (4.87)	15.08
4	Land under non agricultural use	150 (1.0)	160 (1.07)	6.67
5	Cultivable waste	340 (2.28)	387 (2.60)	13.82
6	Permanent pasture	380 (2.55)	459 (3.08)	20.79
7	Land under miscellaneous tree	50 (0.33)	71 (0.47)	42.00
8	Current fallow	1930 (12.97)	1111 (7.46)	-42.44
9	Other fallow	1900 (12.77)	1196 (8.03)	-37.05
10	Net sown area	9184 (61.72)	10416 (70.00)	13.41
11	Area sown more than once	376 (2.52)	2028 (13.63)	439.36
12	Gross cropped area	9560 (64.25)	12444 (83.64)	30.17
13	Cropping intensity	108.1	119	10.08

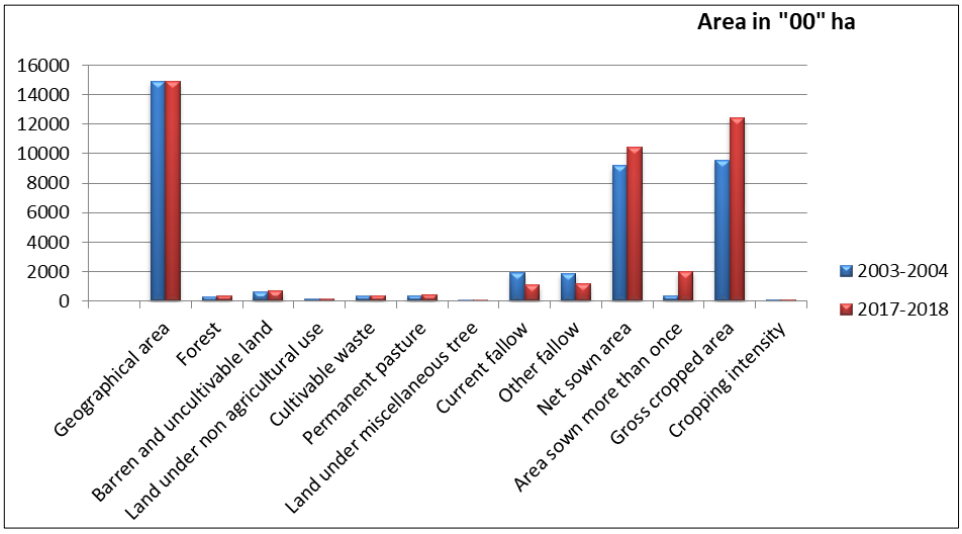

Fig 1: Land utilization pattern of Solapur district (2003-04 to 2017-18)

Changing pattern of land utilization use

The information about the changes in the land utilization pattern of Solapur district is presented in the table. The table shows that, the total geographical area remains constant during the year 2003-04 to 2017-18 and it was 1487800 hectares. Area under the forest was 320.00 hectares which was 2.15 per cent of the total geographical area in 2003-04, which was increased up to 353.00 hectares in 2017-18, which was 2.37 per cent and percentage change was 10.31 per cent. The permanent pasture was increased from 380.00 hectares i.e. 2.55 per cent during 2003-04 to 459.00 hectares i.e. 3.08 per cent. The land under miscellaneous tree 50.00 hectares during 2003-04 which increased up to 71.00 hectares. The percentage change was 42.00 per cent. The current fallow land was 1930.00 hectares i.e. 12.97 per cent which decreased to 1111.00 hectares i.e. 7.46 per cent from the period 2003-04 to 2017-18.

Cropping Pattern

The types of major crops were grown under proportion of area under food grains, cash crops to influence agricultural economy of district. Average of area under different crops were worked out and cropping pattern for two periods are presented. Area under Rice crop was increased from 2.00 hectares to 6.00 hectares during period 2003-04 to 2017-18. The area under Jowar increased from 6141.00 to 6569.00 hectares during the period 2003-04 to 2017-18. The percentage change was 6.96 per cent. The area under Bajara was increased from 97.00 to 286.00 hectares i.e. 1.01 to 2.29 per cent during the year 2003-04 to 2017-18. The area under the Wheat and Maize both crops was increased from 308,148 to 687,758 hectares during 2003-4 to 2017-19.Area under Total cereals increased from 6724.00 to 8323.00 hectares during the 2003-04 to 2017-18. The percentage change was 23.78 per cent.

Changes in cropping pattern

The area under Red gram was increased from 77.00 to 298.00 hectares which was 0.80 and 2.39 per cent of gross cropped area. The percentage change was 287.01 per cent. Area under Green gram was 13.00 hectares in 2003-04 It was increased to 126.00 hectares during year 2017-18. The area under the Gram increased from 280.00 to 682.00 hectares i.e. 2.92 to 5.48 per cent during period 2003-04 to 2017-18. Area under Total pulses was 410.00 ha which was increased up to 1351.00 hectares i.e. 4.28 to 10.85 per cent during the year 2003-04 to 2017-18. The percentage change was 229.51 per cent. Area under the groundnut was increased from 21.00 hectares to 51.00 hectares during 2003-04 to 2017-18. The area under the sunflower are decreased from 216.00 to 210.00 hectares i.e. 2.25 to 1.68 per cent of gross cropped area during the period of 2003-04 to 2017-18. The percentage change was -2.78 per cent. The area under the Safflower and Linseed was also decreases during the same period. The total area under the Oilseed was increased from 382.00 to 614.00 hectares i.e. 3.99 to 4.93 per cent during year 2003-04 to 2017-18.The area under the cotton was decreased from 11.00 to 3.00 hectares during the period of 2003-04 to 2017-18. The percentage change was -73.23 per cent. Area under the Sugarcane was tremendous increased from 486.00 to 1005.10 hectares i.e. 5.08 to 8.07 per cent of gross cropped area during the period of 2003-04 to 2017-18. The area under Total food grains are also increased from 74.62 to 77.41 percent of gross cropped area.

Table 2: Changes in the cropping pattern of Solapur (2003-04 to 2017-18) (Area in "00"ha)

Sr. No.	Particulars	2003-2004	2016-2017	Percentage change
1	Rice	2(0.02)	6(0.04)	200.00
2	Jowar	6141(64.23)	6569(52.78)	6.96
3	Bajara	97(1.01)	286(2.29)	194.85
4	Wheat	308(3.22)	687(5.52)	123.05
5	Maize	148(1.54)	758(6.09)	412.16
6	Other cereals	28(0.29)	18(0.14)	-35.71
7	Total Cereals	6724(70.33)	8323(66.88)	23.78
8	Red gram	77(0.80)	298(2.39)	287.01
9	Green gram	13(0.13)	126(1.01)	869.23
10	Black gram	23(0.24)	216(1.73)	839.13
11	Gram	280(2.92)	682(5.48)	143.57
12	Other pulses	17(0.17)	26(0.20)	52.94
13	Total Pulses	410(4.28)	1351(10.85)	229.51
14	Groundnut	21(0.21)	51(0.40)	900.00
15	Sesamum	1(0.01)	4(0.03)	300.00
16	Nigerseed	1(0.01)	1	0.00
17	Sunflower	216(2.25)	210(1.68)	-2.78
18	Soybean	6(0.06)	335(2.69)	5483.33
19	Safflower	133(1.39)	8(0.06)	-93.98
20	Linseed	3(0.03)	0.8	-73.33
21	Total Oilseed	382(3.99)	614(4.93)	60.73
22	Cotton	11(0.11)	3(0.02)	-73.23
23	Sugarcane	486(5.08)	1005.1(8.07)	106.80
24	Total Food grains	7134(74.62)	9634(77.41)	35.04
25	Gross Cropped Area	9560	12444	30.17

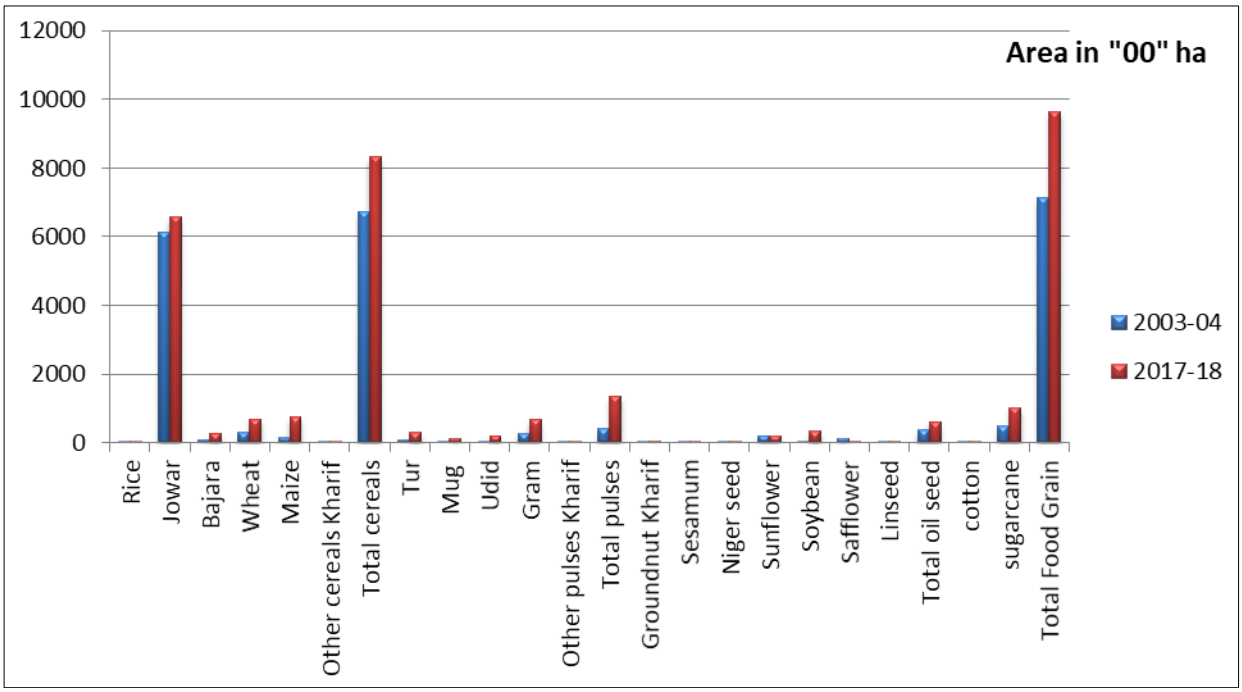

Fig 2: Cropping pattern of Solapur district (2003-04 to 2017-18)

Table 3: Intensity of cropping

Sr. No.	Particulars	2003-2004	2017-2018	Percentage Change
1	Cropping intensity	108.1	119	10.08

The cropping intensity of district was increased from 108.1 to 119 during 2003-04 to 2017-18.

Conclusion

The increase population, the pressure on land top cause diversified nature of land use pattern and cropping of the Solapur district has increased the cropping intensity of land. The cropping pattern of district has changed towards commercialization due to increase in irrigation facilities, transport, towards commercialization due to increase in irrigation facility, transport, communication, market facilities etc. In present scenario the study region needs to adaption of afforestation, changing in cropping pattern, rural communication, development of farmers and labors. Hence, to promote agriculture development and restore the ecological balance in the region. The area under the forest was increased by 10.31 per cent during the study period. The area under the barren and uncultivable land also increased by 15.08 per cent.

The area of land under non agricultural use, cultivable waste and permanent pasture had increased by 6.67, 13.82 and 20.79 per cent respectively during the study period.
The area under current fallow and other fallow had declined by -42.44 and -37.05 per cent and the net sown area was increased by 13.41 per cent.

Recommendations
Irrigation facilities are the major limiting factor for the development of agriculture in Solapur. Therefore the development of irrigation facility should be given top priority in the district. Solapur comes under the drought prone area therefore there is need to increase the irrigation project. Also there is need to increase the micro irrigation like drip and sprinkler irrigation.
Area under the waste land should be brought under horticultural cultivation to promote development of district as there is more scope for processing in this district.
Forest area of the district is less, so there is need to increase the area under forest.

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