

**SPATIO-TEMPORAL ASSESSMENT OF AGRICULTURAL  
PRODUCTIVITY: A CASE STUDY OF AMBEDKAR NAGAR DISTRICT,  
UTTAR PRADESH**

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**Abstract**

Agricultural productivity, one of the components of agricultural land utilization and regional development has long been an important concern for agricultural studies. The identification of productivity pattern and the factors generating them can help improve agricultural production. Agriculture productivity is a measure of the efficiency with which inputs are used in agriculture to produce an output. The agricultural productivity can be defined as the ratio of the index of the total agricultural output to the index of total input used in farm production. It is a multidimensional concept, which includes number of complex factors viz. environmental, technological and institutional. Many physical factors, socio-economic, political and organizational factors like fertile soil, level land, better irrigation facilities, optimum use of fertilizers, prevention from insects and diseases, transportation facilities and nearness to markets etc. are some of the major factors to delimit the agricultural productivity, eventually agricultural productivity is the indicator of agricultural development. It not only provides increased food surplus to growing population but also helps to expand the secondary and tertiary sectors.

**Keywords**

Agricultural Productivity, Crop Yield Index, Ambedkar Nagar District, Socio-Economic Factor

**Objective**

Main objectives of the study are

To assess the spatio-temporal status of agricultural productivity in the region.

To assess crop yield index of different crops in the region.

To delineate factors responsible for agricultural productivity.

**Methodology**



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The secondary data has been used in the study which have been collected from both online and offline government sources. The present study is based upon Yang's method of 'crop yield index' because it concedes the yield of all crop compared with the average yield of crops in the region.

### **Introduction**

Agriculture is the most important sector of Indian economy. It bears the largest proportion in any sector but despite the enormous significance in the economy it is of subsistence nature because very little attention has yet been paid in the agricultural sector in terms of farming practices, production, factors underlying spatial variation and role of new technology. It is, therefore of utmost importance to measure and study the agricultural productivity together with its determinants (Mohammad & Thakur, 1992).

The need to determine statistically, the spatial variation in crop productivity was first realized by Kendall (1939) who devised the ranking co-efficient technique for this purpose but before him Thompson (1926) measured relative productivity of British and Danish farms and expressed it in terms of gross output of crops and livestock. Stamp (1952) applied Kendall's technique on international level in a number of countries by selecting some major crops. Stamp (1958) suggested another method for measuring the agricultural productivity by converting total agricultural productivity into calories. Shafi (1960) applied the Kendall's technique in Uttar Pradesh in forty eight districts. Agarwal (1965) applied 'factoral approach' while measuring agricultural efficiency. Ruttan and Hayami (1970) calculated agricultural labour productivity in developed and less developed countries. Bhalla (1978) considered output per person for measuring productivity of labour in agriculture. Singh (1985) attempted to calculate labour productivity expressed as gross agricultural output. Siddiqui, Rahman, and Siddiqui (1984) calculated the productivity indices of North Bihar plain on the basis of Yang's method.

### **The Area**

Ambedkar Nagar District is a part of Ganges plains situated in the middle eastern part of Uttar Pradesh. The district was constituted by the division of Faizabad district on 29<sup>th</sup> of September 1995 and named after Dr. Bhim Rao Ambedkar. The area under study lies between 26° 9' N - 26° 40' N latitudes and 82° 12'E – 83° 5'E longitudes and has the area of 2350 sq. km. It is surrounded by six districts, clockwise from north these are Basti, Sant Kabir Nagar, Gorakhpur, Azamgarh, Sultanpur and Faizabad districts. The district is divided into five tehsils namely Bhati, Akbarpur, Tanda, Alapur and Jalalpur and nine blocks namely Bhati, Katehri, Tanda, Jalalpur, Ramnagar, Jahangirganj, Akbarpur, Bhiaon and Baskhari. As the district is a part of great Ganges plain, it has almost a

featureless alluvial plain with gentle slope. Soil is the prime resource of the people in the study area as it is inhabited mostly by agrarian population.

The soil of the area is primarily recent or old alluvial forming the fertile agricultural land.

### Findings and Discussion

The crop productivity is the reflection of agricultural land utilization of the region. Total 85.01% (236052 ha.) area was used for cereal production out of total sown area in 2011-12. Rice and wheat together cover 84.32% of the total sown area. In 2000-01 the area under cereal crop production was 86.08% (232998 ha.). The cereal crops in the region include rice, wheat, jwar, barley, millet and maize. In 2000-01 the productivity of cereal crop was very high which was 102.04 and 101.84 respectively (Table 1).

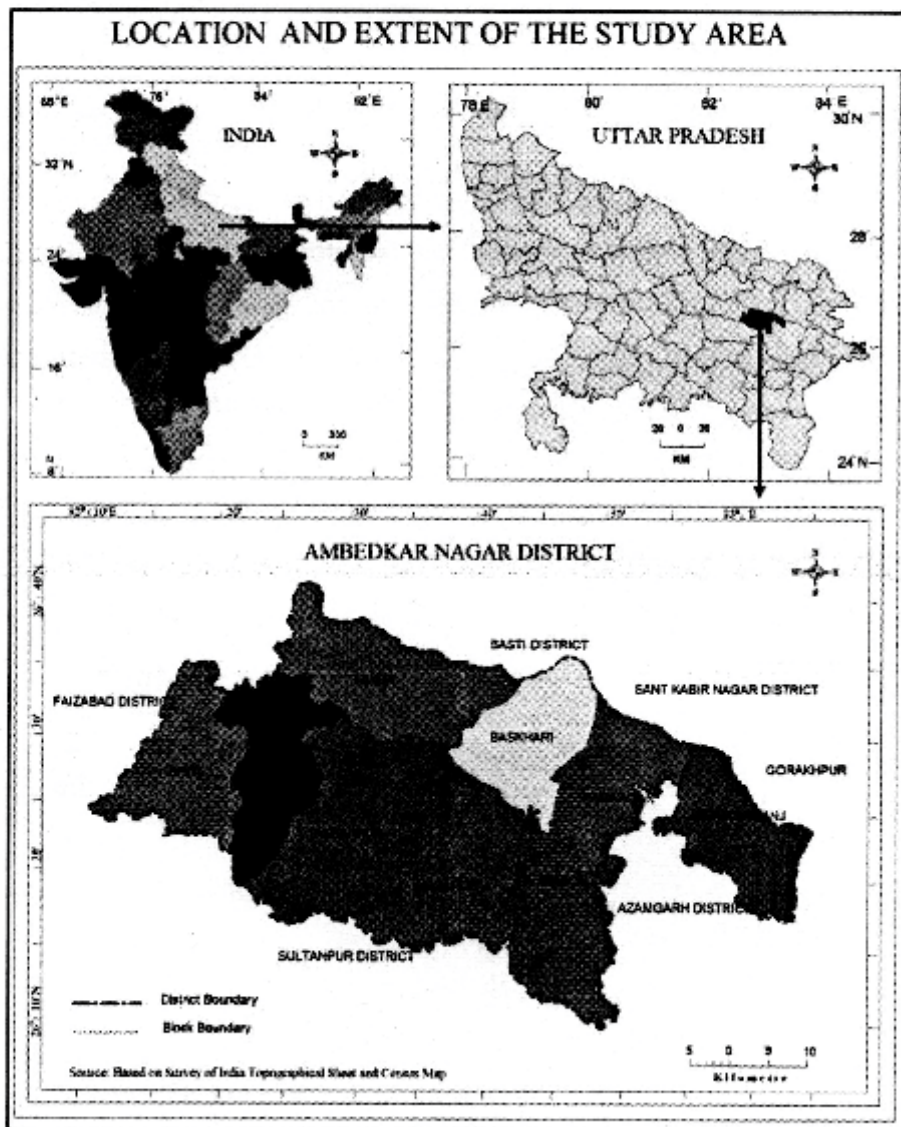


Figure1

Blocks	Crop Yield Index	
	2000-2001	2011-12
Bhiti	98.62	99.32
Katehri	99.00	99.53
Akbarpur	99.97	99.83
Tanda	102.04	99.92
Baskhari	101.84	99.88
Ramnagar	99.96	98.62
Jahangirganj	99.90	99.72
Jalalpur	99.96	99.70
Bhiaon	99.92	98.25

Source: Based on data obtained from district statistical magazine, Ambedkar Nagar (2001- 2012)

The overall productivity of the region is very good where maximum number of blocks comes under high cereal crop production both in 2000-01 and 2011-12. Cereal fulfills maximum hunger need of the population and as the area is very populous, the production of cereal crops remains on prime concern in the region. Several institutional, physical and social factors are responsible for various aspects of the cereal crop production. The low and very low productivity contains each block in both the year. The block Bhiaon which recorded high productivity in 2000-01, reduced to very low productivity in 2011-12 (Table 2 and figure 2). The factors responsible for this category productivity may be traced from socio-economic conditions of the farmers, which are not conducive to the fast development.

**Table 2 Spatial Pattern of Cereal Crop productivity, Ambedkar Nagar District (2000-2012)**

Range (Productivity Index)	Intensity	2000-01		2011-12	
		Number of Blocks	Name of Blocks	Number of Blocks	Name of Blocks
>100.00	Very High	2	Tanda, Baskhari	Nil	Nil
99.40-100.00	High	5	Akbarpur, Ramnagar, Jahangirganj, Jalalpur, Bhiaon	7	Katehri, Akbarpur, Tanda, Baskhari, Ramnagar, Jahangirganj, Jalalpur
98.80-99.40	Low	1	Katehri	2	Bhiti

98.20-99.80	Very Low	1	Bhiti	1	Bhiaon
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Source: Based on data obtained from district statistical magazine, Ambedkar Nagar (2001-2012)

**Table 3 Block Wise Productivity of Pulses, Ambedkar Nagar District (2000-2012)**

Blocks	Crop Yield Index	
	2000-2001	2011-12
Bhiti	99.61	99.72
Katehri	99.69	100.02
Akbarpur	99.55	99.57
Tanda	99.62	99.71
Baskhari	99.64	98.86
Ramnagar	99.83	99.07
Jahangirganj	99.41	99.12
Jalalpur	99.46	99.61
Bhiaon	99.79	99.65

Source: Based on data obtained from district statistical magazine, Ambedkar Nagar (2001-2012)

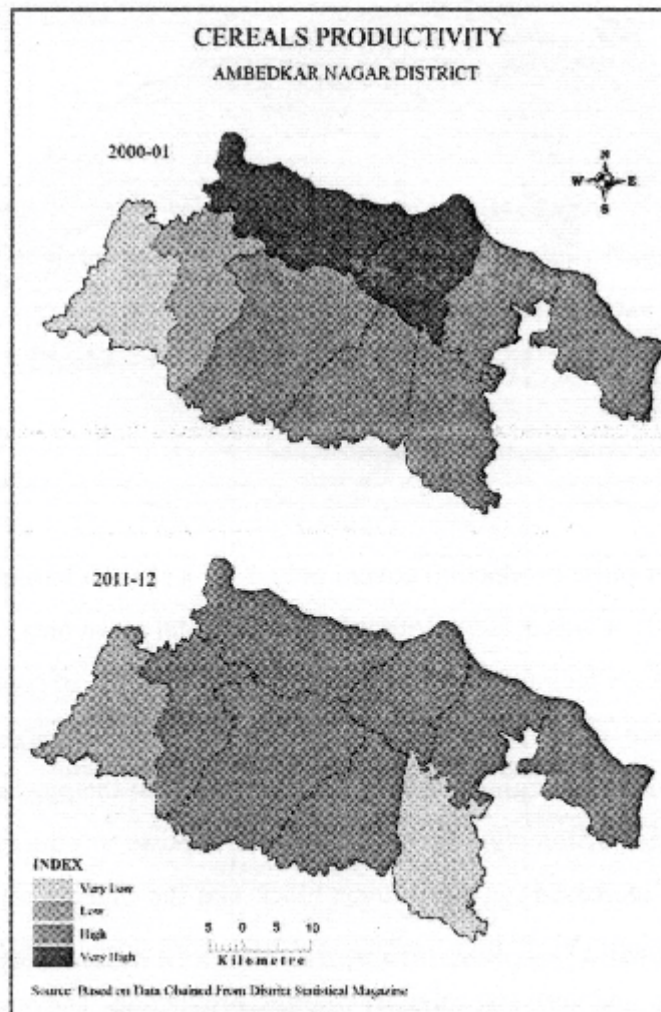


Figure2

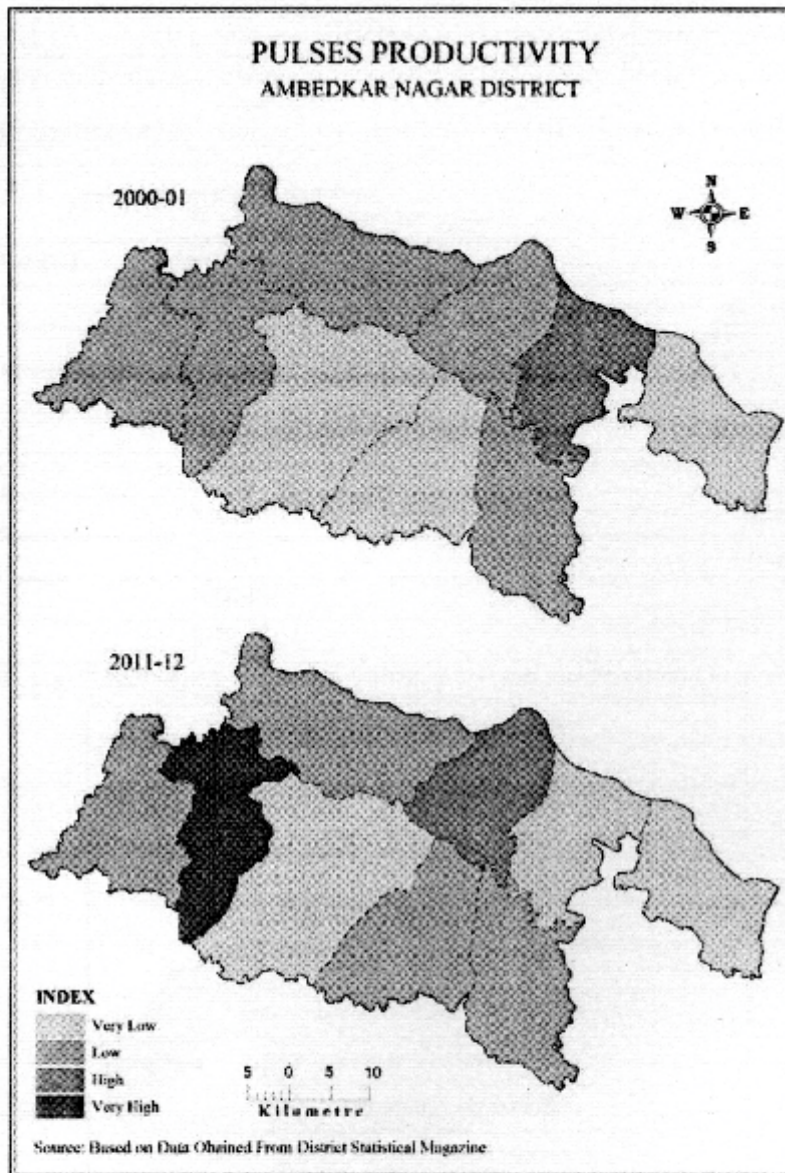


Figure 3

The area under pulse production covers only 3.98% (11045 ha.) of the total sown area in 2011-12 and in 2000-01 it was 5.55% (15009 ha.) of the total sown area. The tendency of pulses production in the region is facing drastic change. The adverse effect of green revolution is directly hitting pulse production in the entire region. Though the productivity of the region is good enough, which showed very marginal variation among blocks in the productivity in 2000-01. The year 2011-12 emerged differently as the area under pulse production decreased but the productivity has been increased, where Katehri block had the highest production of pulse crop. While categorization into Very high, high, low and very low categories, maximum block concentrated under low and very low category of pulse production. The temporal variation is quite

visible in pulse production in all the blocks as Ramnagar block which had high productivity in 2000-01 resulted into very low productivity in 2011-12 (Table 3 and 4) .

**Table 4 Spatial Pattern of Pulse Productivity, Ambedkar Nagar District (2000-2012)**

Range (Productivity Index)	Intensity	2000-01		2011-12	
		Number of Blocks	Name of Blocks	Number of Blocks	Name of Blocks
100.00-100.20	Very High	Nil	Nil	1	Katehri
99.80-100.00	High	1	Ramnagar	1	Baskhari
99.60-99.80	Low	5	Bhiti, Katehri, Tanda, Baskhari, Bhiaon	4	Bhiti, Tanda, Bhiaon, Jalalpur
99.40-99.60	Very Low	3	Jahangirganj Jalalpur, Akbarpur	3	Jahangirganj, Ramnagar, Akbarpur

Source: Based on data obtained from district statistical magazine, Ambedkar Nagar(2001-2012)

**Table 5 Block Wise Productivity of Cash Crops in Ambedkar Nagar District (2000-2012)**

Blocks	Crop Yield Index	
	2000-01	2011-12
Bhiti	99.87	99.97
Katehri	99.99	113.62
Akbarpur	99.99	99.95
Tanda	99.99	99.90
Baskhari	99.99	99.90
Ramnagar	99.65	100.00
Jahangirganj	100.03	99.65
Jalalpur	100.00	99.99
Bhiaon	100.00	99.99

Source: Based on data obtained from district statistical magazine, Ambedkar Nagar(2001-2012)

Cultivation of cash crop constitutes the second ranking crop though it covers only 5.55% (15409 ha.) of the total sown area in 2011-12. In the year 2000-01 the cash crop was placed on

third position after cereals and pulses with 5.37% (14527 ha.) out of total sown area. Cash crop includes basically sugarcane and potato in the district. In cash crop production maximum concentration of blocks lies under high category whereas Jahangirganj in 2000-01 and Katehri in 2011-12 recorded very high productivity. The ratio of crop yield index for very high category is higher than all other crops in the region. The other varieties of cash crop need to be grown in the region to strengthen the economic status of the farmers and to present an alternative option for them.

**Table 6 Spatial Pattern of Productivity of Cash Crops in Ambedkar Nagar District (2000-2012)**

Range (Productivity Index)	Intensity	2000-01		2011-12	
		Number of Blocks	Name of Blocks	Number of Blocks	Name of Blocks
100.05-100.20	Very High	1	Jahangirganj	1	Katehri
99.90-100.05	High	6	Katehri, Akbarpur, Tanda, Baskhari, Jalalpur, Bhiaon	5	Bhiti, Akbarpur, Ramnagar, Jalalpur, Bhiaon
99.75-99.90	Low	1	Bhiti	2	Tanda, Baskhari
99.60-99.75	Very Low	1	Ramnagar	1	Jahangirganj

Source: Based on data obtained from district statistical magazine, Ambedkar Nagar(2001-2012)

The spatio-temporal change has been observed in the cash crop productivity in the region as shown in the table 6 and figure 4 Surprisingly the Jahangirganj block, which had the very high productivity in 2000-01, recorded very low productivity in 2011-12. Irrigation facilities played very dominant role in the cash crop productivity of this block. In absence of adequate irrigation in 2011-12 Jahangirganj block failed to keep its record. Another important thing to be noted is the concentration of maximum block in high intensity of cash crop productivity in both the year in the region. The high productivity represents a good potential of cash crop productivity but the very few varieties of crop is the matter of concern as has been discussed earlier

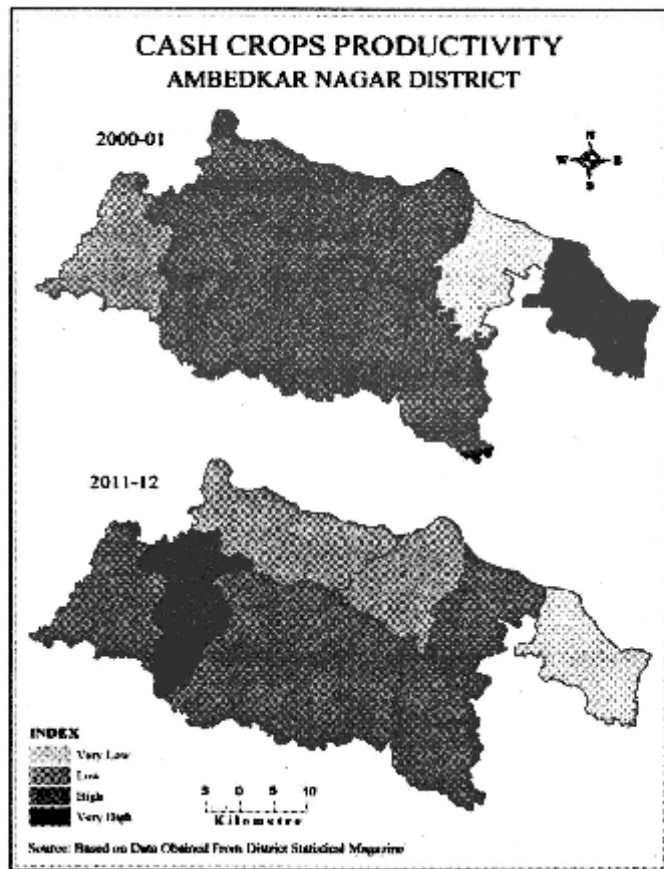


Figure 4

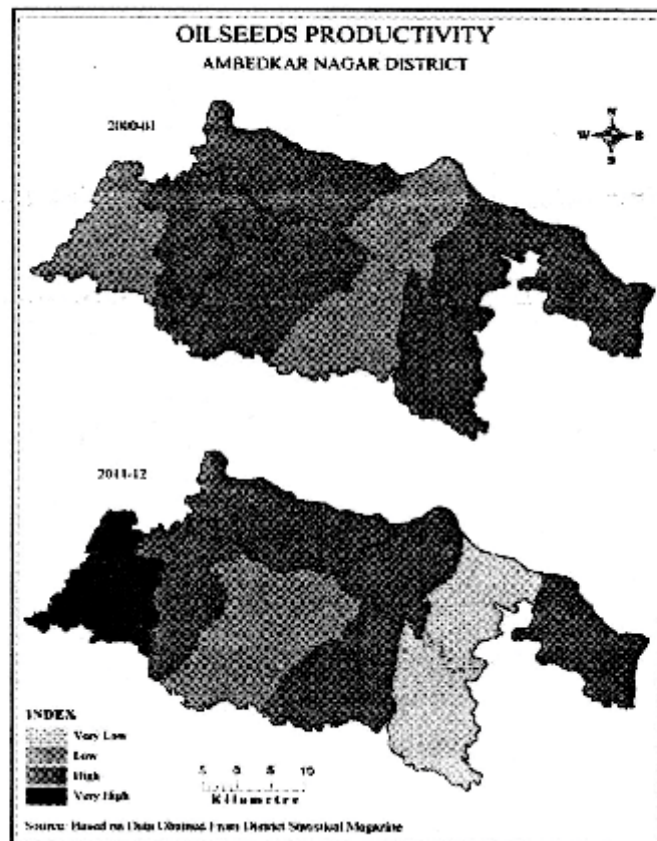


Figure 5

**Table 7 Block Wise Productivity of Oilseeds in Ambedkar Nagar District, (2000-2012)**

Block	Crop Yield Index	
	2000-01	2011-12
Bhiti	99.24	100.29
Katehri	99.70	99.56
Akbarpur	99.84	99.40
Tanda	99.87	99.53
Baskhari	99.35	99.55
Ramnagar	99.85	98.97
Jahangirganj	99.85	99.56
Jalalpur	99.41	99.88
Bhiaon	99.70	98.68

Source: Based on data obtained from district statistical magazine, Ambedkar Nagar (2001-2012)

Oilseeds are the fourth main crop after cereal crop, cash crop and pulses, covers only 1.31% (3644 ha.) in 2011-12 and 1.04% area (2802 ha.) in 2000-01. The crops under oilseed are mustered, lahi, groundnut, sunflower etc. The small area for oilseed crop production is the adverse effect of the green revolution which has promoted cereal crops extensively. The productivity index for 2011-12 ranges between 98.68-100.29, however maximum blocks have more than 99 crop yield index. In 2000-01 the oilseed productivity index showed less variation though it ranges between 99.24-99.8 (Table 7)

**Table 8 Spatial Pattern of Productivity of Oilseeds in Ambedkar Nagar District (2000-2012)**

Range (Productivity Index)	Intensity	2000-01		2011-12	
		Number of Blocks	Name of Blocks	Number of Blocks	Name of Blocks
>100.00	Very High	Nil	Nil	1	Bhiti
99.50-100.00	High	5	Katehri, Tanda, Ramnagar, Jahangirganj, Bhiaon, Akbarpur	5	Katehri, Tanda, Jahangirganj, Jalalpur, Bhiaon
99.00-99.50	Low	3	Bhiti, Baskhari, Jalalpur	1	Akbarpur,
<99.00	Very Low	Nil	Nil	2	Bhiaon , Ramnagar

Source: Based on data obtained from district statistical magazine, Ambedkar Nagar(2001-2012)

It is evident from the table 8 and figure 5 that maximum blocks both in the year 2000-01 and 2011-12 came under high productivity of oilseed. In 2011-12 Bhiaon and Ramnagar

are categorized into very low productivity and Bhati recorded very high productivity. The variation in productivity is the result of socio-economic as well as natural hindrances. These conditions affect the utilization of land under the oilseed productivity.

To delineate the general pattern of productivity and demarcate very high, high, low and very low productivity regions a composite crop yield index was calculated for the year 2000-01 and 2011-12 in all nine blocks. In the district a range of crops are sown like rice, wheat, barley, jwar, millet, maize, urad, moong, masur gram, pea, arhar, mustard, groundnut, sunflower, sugarcane, potato, tobacco etc and a range of vegetables, which have different crop yields. Different crop yields of composite agricultural productivity for different blocks are shown in the table 9.

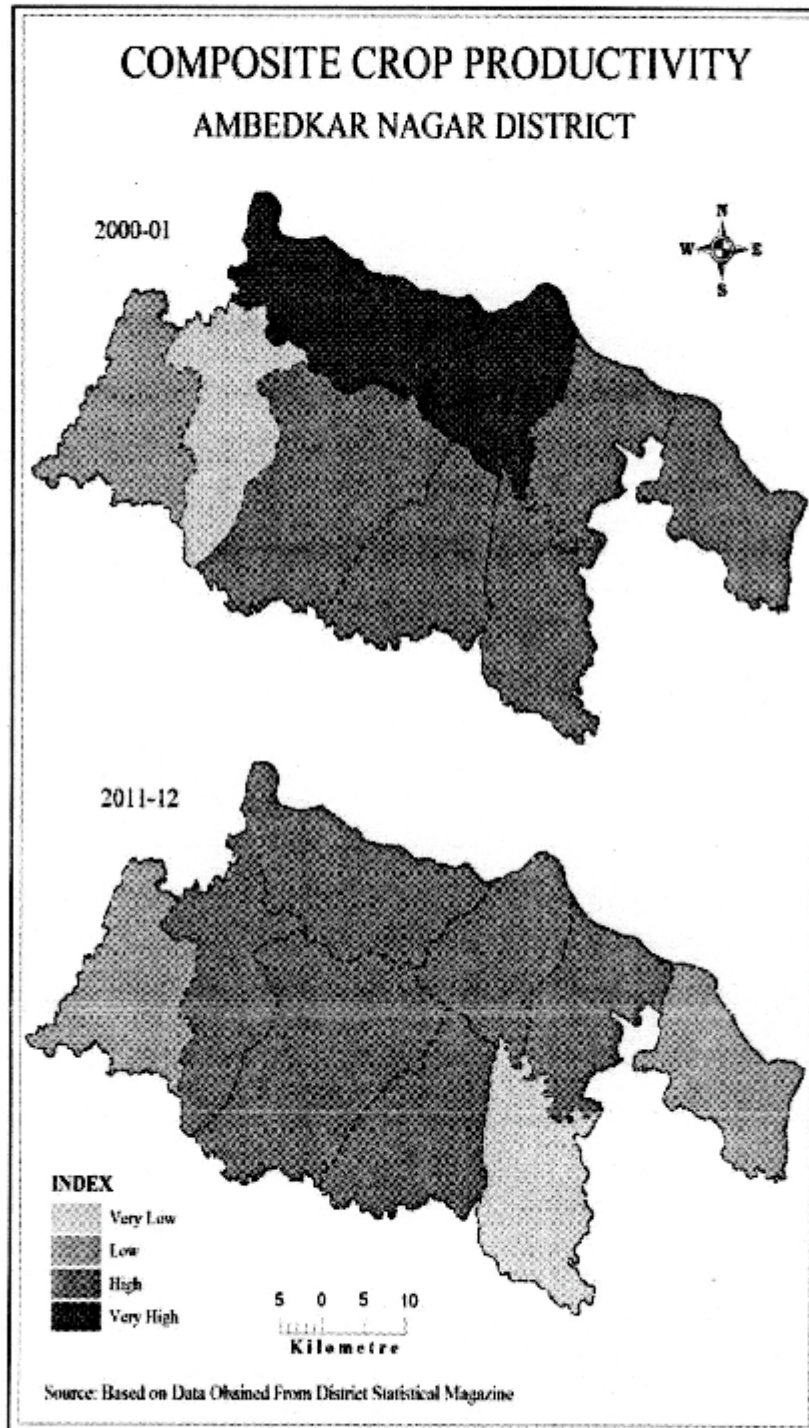
**Table 9 Composite Agricultural Productivity, Ambedkar Nagar District (2000-2012)**

Blocks	Crop Yield Index	
	2000-01	2011-12
Bhati	98.64	99.41
Katehri	99.09	100.23
Akbarpur	99.95	99.82
Tanda	101.75	99.91
Baskhari	101.55	99.78
Ramnagar	99.94	98.72
Jahangirganj	99.88	99.70
Jalalpur	99.93	99.72
Bhiaon	99.92	98.49

Source: Based on data obtained from district statistical magazine, Ambedkar Nagar (2001-2012)

Spatial patterns are being presented by table 10 which shows the ranges of different crop yields. In the year 2000-01 Tanda and Baskhari had the highest agricultural productivity because they received proper fertilizers and assured irrigation with tube wells and canal. Index ranging from 90.70-100.30 comes under high productivity, includes maximum number of blocks namely Ramnagar, Jahangirganj, Jalalpur, Akbarpur and Bhiaon. Most of the blocks under this category have nearly 100 crop yield index, means they are almost equal to the average productivity of the district. More or less uniform irrigation and other infrastructural facilities are provided here. One block each comes under low and very low category they are Bhati and Katehri respectively. In the year 2011-12 the composite crop yield value recorded decrease at district level. The table 10 shows that there is no block under

very high crop yield value whereas six blocks comes under high crop yield index namely Katchri, Akbarpur, Tanda, Baskhari, Ramnagar and Jalalpur. The Tanda and Baskhari which



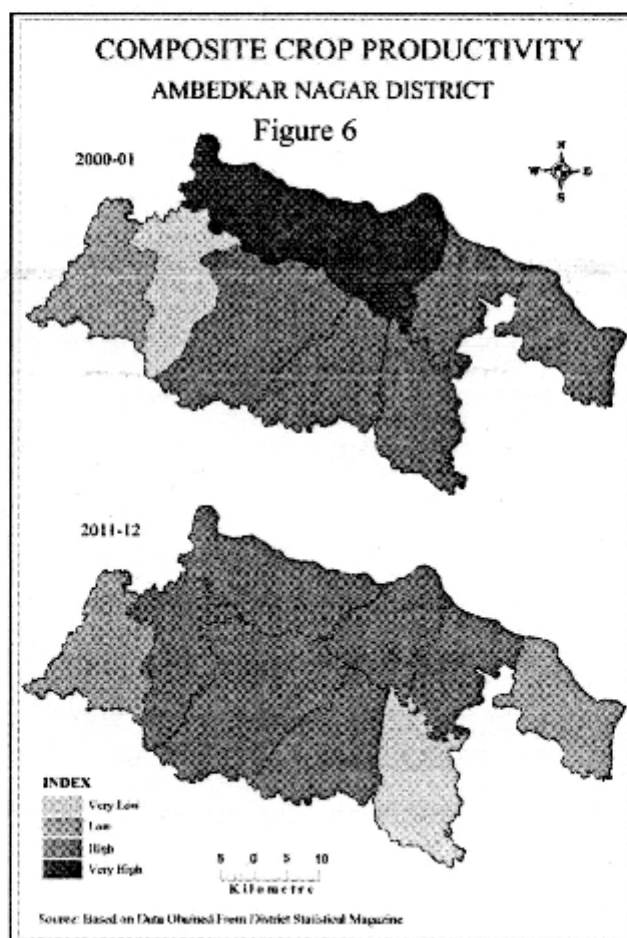
recorded very high agricultural productivity in 2000-01 decreased to high range due to basically fertility lose. The blocks under low category also increased to two. The block

Jahangirganj which was under high category in 2000-01 recorded decrease in production. The block Bhiaon was surprisingly recorded very low productivity.

**Table 10 Spatial Pattern of Composite Agricultural Productivity in Ambedkar Nagar District(2000-2012)**

Range (Productivity Index)	Intensity	2000-01		2011-12	
		Number of Blocks	Name of Blocks	Number of Blocks	Name of Blocks
100.30-100.90	Very High	2	Tanda, Baskhari	nil	Nil
99.70-100.30	High	5	Ramnagar, Jahangirganj, Jalalpur, Akbarpur, Bhiaon	6	Katehri, Akbarpur, Tanda, Baskhari, Ramnagar, Jalalpur
99.10-99.70	Low	1	Bhiti	2	Bhiti, Jahangirganj
98.40- 99.10	Very Low	1	Katehri	1	Bhiaon

Source: Based on data obtained from district statistical magazine, Ambedkar Nagar, (2001-2012)



**Conclusion**

The agricultural performance in Ambedkar Nagar district is characterized with marked productivity variations. These variations in productivity are influenced by the physical and socio-economic factors. As far as the area is concerned there are more socio-economic factors than physical which influence the productivity in the region. The area has a fertile featureless alluvial plain, very conducive for agriculture but sometimes due to lack of sufficient economic support and agricultural inputs people are not able to produce desired crop, leading the area to low productivity region. The assessment of agricultural productivity makes it easy to regionalize agricultural areas in any region reflecting certain specific qualities. It also presents some pathways for planners to strike strategies for the agricultural development as well as the socio-economic development of the people of the particular area.

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