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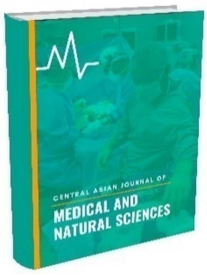

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Yield Gap Analysis of Mustard in District Sonbhadra

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Abstract: Food security of India depends on mustard. The study was conducted in Sonbhadra region of Uttar Pradesh to assess yield gap at farmers' field. Sonbhadra was purposively selected because of large area under the mustard system. Out of the this district blocks with maximum area under mustard system were selected. From the selected villages, 120 farmers were selected through proportionate random sampling from small (up to 2.00 hectares), medium (above 2.00–4.00 hectares) and large (more than 4.00 hectares) farmers. There is a yield gap on all the farms. The yield gap-II was more than the yield gap-I. The major constraints responsible for yield gap were late sowing/transplanting, higher prices of seed, nonavailability of fertilizer at sowing time, lack of funds with farmers and infestation of pest and disease. There is further scope to increase productivity on the farms by managing the constraints. Providing quality inputs to the farmers at right time in sufficient quantity can help in reducing yield gap. Increasing agricultural productivity or yield is critical to economic growth and development. This can be achieved by using improved agricultural technologies and management systems. Yield refers to production per unit area. Yield gap is calculated by subtracting achieved average yield from the yield potential. Understanding yield gap is very crucial for it can assist in yield predictions since yield potential shows the probable future productivity to be achieved. Also, information on determinants of yield gap can be used in policy interventions for enhancing production. In order to meet increasing demands of food due to increasing population and income, food production in India need to be increased.

Keywords: mustard, yield gap analysis, Sonbhadra, green revolution, agriculture, Uttar Pradesh, rain-fed, food production.

However, lately there has been a significant slow-down in the growth rate in the cultivated area, production and yield. The production of food grains in India increased considerably since 1960s due to increase in arable area, large-scale cultivation of high yielding semi dwarf varieties and increased applications of irrigation, fertilizers and pesticides. India became food secure in the last three decades, at gross level, because of increase in food production. The food security of India and other countries in South Asia is, however, now at risk due to increase in population. By 2050, India's population is expected to grow to 1.6 billion people from the current level of 1.1 billion. The gradual increase in environmental degradation through intensive ping systems is further compounding the problem. There is now a great concern about decline in soil fertility, change in water table depth, rising salinity, resistance of harmful organisms to many pesticides and degradation of quality of irrigation water in north-western India. It is very important to know how much additional food can be produced in different regions to meet the increasing demand. In view of such stagnations, we need to know if the genetic yield ceiling has been reached for critical or if there are some other factors that are not allowing yields to increase. Estimates of these potentials can assist in quantifying the carrying capacity of agro ecosystems. Rain-fed agriculture in India is practiced on 94 million hectares (M ha). These areas generally have bypassed from the benefits of green revolution and as a result, grain yields remain low. The cultivated area, production and yield of different were obtained from the published data of the Ministry of Agriculture, Government of India. These yields were considered as the measured yields to calculate yield gaps. It may be noted that state averages are the means of irrigated and rainfed areas and hence rain-fed yields will be overestimated, especially in such as mustard where irrigated areas are large.

INTRODUCTION

Regression results on determinants of yield gap revealed that technology adoption level is one of the important determinants of yield gap in all the three cultivated in the study area. Therefore, farmers are required to be educated to adopt full package of practice along with the provision of timely availability of agro inputs in required quantity. ADO/Ag. scientist meeting per year was also found important determinants of yield gap among all the. So increasing the frequency of meetings and interaction with ADO/Ag. scientist will help in increasing the yield of the mustard .

Role of Biofertilizer in maintaining nutritional status of soil in Sonbhadra. This study was conducted to evaluate the yield trends, attainable yields, and yield gaps for the 10 largest mustard producing countries in the world and more localized yield statistics at the state or county level. These data were assembled from available government sources. Attainable yield was determined using an upper quantile analysis to define the upper frontier of yields over the period of record and yield gaps calculated as the difference between attainable yield and actual yield for each year and expressed as a percentage of the attainable yield. In all countries, attainable yield increase over time was larger than the yield trend indicating the technological advances in genetics and agronomic practices were increasing attainable yield.[1] Yield gaps have not shown a decrease over time and reflect that weather during the growing season remains the primary limitation to production. Yield gap closure will require that local producers adopt practices that increase their climate resilience in mustard production systems. District Sonebhadra is one of the largest district of the Uttar Pradesh with the total geographical area of 680961 hectare out of which 79937 hectare is net sown area. The district is situated in south eastern part of the state. It lies between 23.520 to 25.320 northern latitude and between 82.720 to 83.330 eastern longitude. The district is surrounded by district Chandauli, Varanasi part of Mirzapur district in north and bordered by state of Madhya Pradesh and Chattisgarh in the south, state of Bihar, Jharkhand and part of Chattisgarh are in the east, while state of Madhya Pradesh is in the west. On the basis of its topography, soil, micro-climate, the district has 4 distinct characters

viz. the northern part of the district which is plains of Ganga, Son, Karmnasa and Belan rivers; the southern part of the district is plateau region transected by Son, Renu, Bihul and Kanhar rivers, eastern part is plain land of Belan and Karmanasa rivers while western part is also plain region of Belan river.

The district consists of three sub division (Tehsil) and 8 blocks with headquarter at Robertsganj. There are 67 Nayaya Panchyat, 501 Gram panchayat and 1443 revenue village in the district. As per the census 2001, the total population of the district is 15.05 Lac comprising of 7.92 lac males and 7.13 lac females.[2] Out of the total population, 82% population is residing in rural areas and 18% in Urban areas. The schedule cast and scheduled tribe population of the district is 625555 (41.56%) and 493 (0.00033%) respectively. Average literacy percent in the district is 49.32%. There are 167252 land holdings which cover about 231899 hectare of land. Out of total land holdings 135855 (about 81%) are less than two hectares while only 12624 (0.08%) are above four hectares. The district is characterized by warm and humid climate from June to September and dry and cool weather from October to February-March. April to June are characterized by hot winds. The mean maximum & minimum temperature recorded in the past are 45.80c and 2.80c respectively. The average rainfall received in the district in last five year was much below from the normal average of 997mm. Sonbhadra district is very rich in forest vegetation which has very good bio diversity. The forest in the district is spread over 333608 hectare which is approximately 49.09% of total geographical area but the actual forest cover is only 36.50% of total geographical area, which is very rich in Medicinal plant and forest biodiversity. The major ping system of the district is Rice-Mustard. The major of the district are Paddy, Mustard, Arhar, Gram, Lentil, Lineseed, Sesamum, Pea and Vegetables like Tomato, Brinjal, Chilli, Cucurbits and broad beans. The cattle breeds are mostly non-descriptive with low milk productivity. Goat & sheep are other domestic animals dominant in district. The lack of irrigation facilities is one of the major factors affecting production and productivity of in this district. Major source of irrigation is canal supplying water from the reservoirs after storing rain water. This water is not sufficient for providing irrigation to Kharif and Rabi season .[3] Management of red, black soils with shallow depth and rocky nature located in undulated terrain is another problem of the district.[10] Sonbhadra has a sex ratio of 996 females for every 1000 males. In census enumeration, data regarding child undeg age six were also collected for districts Sonbhadra. There were total 323,092 children under age six against 302,834 of 2001 census. Of total 323,092 male and female were 167,870 and 155,222 respectively. Child sex ratio as per census 2011 was 925 compared to 956 of census 2001. In 2011, children under age six formed 17.35 percent of Sonbhadra District compared to 20.69 percent of 2001.

DISCUSSION

The Manager (QC)/ Technical Assistants must send details of daily arrivals (variety wise) in the mandis and purchases made by them, purchases made by the State Govt./Agencies as well as the traders along with the prevailing market rates to the District Offices, which will in turn furnish the position of whole district to the Control Room set up at Regional Office, Lucknow (agmcrup.fci@nic.in). The Area Managers shall also ensure feeding of data in Procurement Monitoring System (PMS). Monitoring of market price of mustard should also be undertaken on AGMARK portal to prevent any distress sale of mustard. GOI has directed that purchase made by Govt. Agencies at MSP be reported in AGMARK using URL [4] www.agmarknet.gov.in/login.aspx. FCI district offices should ensure that centers opened by FCI are linked in AGMARK Portal and data is fed on regular basis on the portal. Comments on daily report by AGMARKNET of below MSP purchase are to be replied promptly. District offices should coordinate with State Govt. for feeding of data on portal. Monitoring and reporting of arrivals and procurement by different agencies including pvt. traders/millers on daily basis is considered to be an effective tool to curb the possibility of recycling or fictitious procurement. Therefore, Area Managers should personally monitor these and

ensure timely reporting to Regional Office. Any delay in submission of daily procurement figures by the State Govt. should serve as adequate warning signal to District Offices and it should become very vigilant to obviate any possibility of recycling/ fictitious procurement. Any instance of state agencies undertaking procurement beyond period fixed by GOI be promplty brought to the notice of Regional Office and State Govt. The final figures of procurement must be intimted within 03 days of cessation of procurement period prescribed by GOI[5]

District Profile

Geographical Location	
Longitude	82.72 & 83.33 East
Latitude	23.52 & 25.32 North
Geographical Area	6788.0 sq Km
Average Height from Sea Level	285 feet
Average Rainfall	1036.6 mm
Temperature	(In degree centigrade)
In Summer	10 - 45
In Winter	8 - 25
Population	
Male	7,71,817
Female	6,91,651
Total	14,63,468
Literacy	
Male	51.31%
Female	27.09%
Total	39.86%
Number of Tehsils	3
Number of Blocks	8
Total Nyay Panchayat	66
Total Gram Sabha	489
Total Number of Villages	1426
Number of Police Stations	16
Post Offices	137
Nationalised Banks	53
Small Scale Industries	3097
Education	
Junior Basic School	1069
Senior Basic School	155
Higher Secondary School	40
Degree College	4
Hospitals	
Allopathic	17
Ayurvedic	19
Homeopathic	22
Unani	1
Special Hospitals	
T.B.	1
Leprosy	2

Primary Health Centres	**31**
Family Welfare Centres	**11**
Electrified Villages	**717**
Theatres	**7**
Scheduled Tribe Population	**385018**

Area, Production and Productivity of major crops cultivated in the district

S.N.	Crop	Area (ha)	Production (Qt)	Productivity (Qt /ha)
1	**Paddy**	**30582**	**34408**	10.27
2	**Wheat**	**56692**	**107924**	19.04
3	**Barley**	**7130**	**6045**	8.48
4	**Jowar**	**2805**	**1624**	5.79
5	**Bajara**	**366**	**387**	10.57
6	**Maize**	**14450**	**11430**	7.91
7	**Sawa**	**5701**	**2189**	3.84
8	**Kondo**	**4273**	**1235**	2.89
9	**Urd**	**2461**	**914**	3.71
10	**Moong**	**25**	**10**	4.00
11	**Lentil**	**8059**	**6641**	8.24
12	**Gram**	**8806**	**8640**	9.81
13	**Pea**	**3698**	**3239**	8.76
14	**Arhar**	**15227**	**5818**	3.82
15	**Mustard/Toria**	**2901**	**1714**	5.91
16	**Linseed**	**5701**	**1693**	2.97
17	**Sesamum**	**4614**	**655**	1.42
18	**Potato**	**828**	**12515**	151.14

Annual Weather Data

Average Annual Rainfall (mm)	Average Temperature C		
1035	Maximum	:	49.8
	Minimum	:	2.8

RESULTS

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The major cropping system of the district is Rice-Wheat. The major crops of the district are Paddy, Wheat, Arhar, Gram, Lentil, Lineseed, Sesamum, Pea and Vegetables like Tomato, Brinjal, Chilli, Cucurbits and broad beans. The cattle breeds are mostly non-descriptive with low milk productivity. Goat & sheep are other domestic animals dominant in district. The lack of irrigation facilities is one of the major factors affecting production and productivity of crops in this district. Major source of irrigation is canal supplying water from the reservoirs after storing rain water. This water is not sufficient for providing irrigation to Kharif and Rabi season crops. Management of red, black soils with shallow depth and rocky nature located in undulated terrain is another problem of the district.[7]

CONCLUSIONS

The study area had more than 50 per cent area under leafy plants like mustard of total cropped area followed by pulses (19.84 per cent), other crops (8.50 per cent), oilseeds (7.62 per cent), commercial crops (2.19 per cent) and industrial crops (0.19 per cent) in 2014-15. There was decreasing trend of cropping of all kind of Changing Pattern of Agricultural Land Use in Sonbhadra District, U.P.[8] 36 crops since 1995 to 2015 except commercial crops (553.16 per cent) and pulses (12.60 per cent) because these crops provide basic and daily needs of food supply to the people. On the other hand, food-grains, oilseeds, industrial crops and other crops had decreasing trend just because agricultural activity is the major work of the people. Mining, industries and forest based food and other products

provide their need and enhance the economic condition. Decreasing trend of all cropped areas is major concern for the district. These trend happened because of use of agricultural land for another activities like, transportation, industries, housing etc. The farmers of the study area facing more challenges of livelihood due to transformation of agro-land into non-agro activities.[9,10]

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