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A comparative study on production, productivity and economic returns of Rabi onion to different states of India

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ABSTRACT

The study was carried out in twelve states of India during 2018-19; the data were elicited through annual report of National Horticultural Research and Development Foundation (NHRDF) - New Delhi and personal interview of scientist. Problems of onion crop production and their productivity solutions at state farming situations were studies. In this regard, demonstrations on integrated crop management in onion varieties, farmer's trainings and seminars were conducted in 2018-19 during Rabi season by NHRDF under National Horticulture Mission, in different states locations of India and data were collected and centrally compiled in annual report. The highest average yield of state was obtained in Bihar state 300 q/ ha (cost of production Rs 196922.00) and lowest in Tamil Nadu state (175 q/ha) against maximum cost of production Rs 2087070.00 per ha with highest production cost Rs 1193.00 per quintal. The maximum technology gap was recorded in Tamil Nadu state in 175.00 q/ha and minimum in Bihar 50 q/ha. The technology index shows the feasibility of the technology at farmer's field and adoption sincerity of the farmers in state. The lower value of technology index more is the feasibility. The technology index was minimum in Bihar 14.29% and maximum in Tamil Nadu 50%. Higher net monetary returns of Rs 176542 .00 in Madhya Pradesh due to adopt best practices with optimum cost of production (Rs/ha) and lowest in Tamil Nadu Rs 1293.00 and it was due to maximum expenses incurred on cost of production. Similarly highest B: C ratio was observed in Punjab 2.35 and lowest in Tamil Nadu 1.01. Production and productivity of onion yield between state yield were varied and differences from state yield, project yield with potential yield can be make up by more emphasis on disseminate to awareness regarding technologies and improved cultivation practices to states, where more gap of yield were observed. Planning of crop demonstrations as well as trainings is an effective extension mean to disseminate the proven technology at farmers level and to bridge the yield gap that increase the crop yield, monetary returns and livelihood status of the farming community.

Keywords: Onion, Economics, Analysis, Production, Productivity

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INTRODUCTION

Onion (Allium cepa L.) is one of the most popular vegetables that form of the daily diet. In India, onion an important commercial crop widely grown in different part of the country. At present, India stands second in the world after China with accounts for 16 percent of the world's area by (FAO, 2012). Onions produced by India are famous for their pungency and available round the year. Onion is an indispensable item in every kitchen as continent and vegetable. It is used either in raw form and dehydrated form to add favour and taste to Indian cousins. Since onion has medicinal value, it is used in some pharmaceutical preparation also. China ranks first in area and second in onion production in the world. During 2018-19, the state wise area under onion in India has presented in table 1. The productivity of onion is much low in India than the world average (Lawande, 2005). The production and productivity of onion is varying in state to state specially in Assam are low in compared to Gujarat, Maharashtra, Bihar and other onion growing states (Gupta and Singh, 2010). That is due to lack of knowledge to farmers regarding suitable seasons, un availability of high yielding varieties, varieties for different seasons, climate, Soil and improved cultivation techniques are the main reasons. Unawareness of the characteristic of the varieties, seasonality's and adoption of proper package of practices are also the reasons responsible for limiting the production and productivity of onion directly or indirectly (Pandey and Bhondey, 2002).

In the study made to compile production level of onion crop at state wise, it comes to know that, among all the production state contribute a major share in the onion crop production. Hence, a large number of crop demonstrations on integrated

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crop management in onion with new high yielding variety were conducted in 2018-19 during rabi season by National Horticultural Research and Development Foundation, in different locations of 12 states through TDTD (Technology Dissemination through Demonstration) under National Horticulture Mission at selected farmers' fields, but adoption level was highly varied. Any technological improvement or productivity enhance in agriculture, not only contributes to overall economic growth but it also provides immediate microeconomic benefits for a large number of rural households. Onion production was found much higher in Rabi season compared to the kharif and late kharif season. Market price of input that was prevailing at the time of their use was considered for working out of cost of cultivation. The gross return was calculated on the basis of market price of the produce at the time when the produce is ready for sale. Net return Rupees per hectare was calculated by deducting the cost of production from the gross income.pple (CA) leaves of various sizes were gathered

Table 1: Weight and volume of the left thymus and right thymus

States /UTs	Area	Production	Productivity		
	('000 ha)	Share %	('000 MT)	Share %	(Tonnes/ha)
Assam	8.21	0.67	84.84	0.37	10.33
Gujarat	44.33	3.64	1111.09	4.87	25.06
Maharashtra	450	36.90	8047.00	35.26	17.88
Madhya Pradesh	145.00	11.89	3672.00	16.09	25.32
Chhattisgarh	26.10	2.14	431.68	1.89	16.54
Tamil Nadu	32.00	2.62	301.00	1.32	9.41
Punjab	9.61	0.79	219.79	0.96	22.87
Karnataka	166.00	13.61	2558.00	11.21	15.41
Kerala	0.01	0.00	0.05	0.00	10.00
Haryana	32.01	2.62	780.15	3.42	24.37
Himachal Pradesh	2.84	0.23	56.60	0.25	19.92
Uttar Pradesh	26.90	2.21	440.38	1.93	16.37
Uttarakhand	4.37	0.36	44.60	0.20	10.21
Bihar	56.50	4.63	1311.45	5.75	23.11
Jharkhand	17.99	1.48	289.66	1.27	16.10
Rajasthan	63.10	5.17	997.26	4.37	15.80
Andhra Pradesh	44.58	3.66	980.66	4.30	22.00
Telangana	13.67	1.12	309.29	1.36	22.62
Tripura	0.15	0.01	0.97	0.00	6.40
Odisha	33.09	2.71	373.22	1.64	11.28
Manipur	0.52	0.04	5.68	0.02	11.01
Meghalaya	0.56	0.05	5.00	0.02	8.97
Mezoram	0.27	0.02	25.02	0.11	92.67
Nagaland	0.62	0.05	5.98	0.03	9.64
Jammu & Kashmir	4.32	0.35	77.84	0.34	18.03
Sikkim	0.63	0.05	35.35	0.15	56.45
West Bengal	35.20	2.89	638.38	2.80	18.14
Others	0.95	0.08	16.48	0.07	17.31
Total	1219.52	100	22819.43	100	18.71

Source: Division of Horticulture Statistics, Ministry of Agriculture and Farmer Welfare, Government of India

MATERIALS AND METHODS

The present study was carried out during Rabi season on the 12 states of India where NHRDF were implemented MIDH (Mission for Integrated Development of Horticulture) under National Horticulture Mission project funded by Govt. of India through TDTD (Technology Dissemination through Demonstration) during 2018-19. In this study basic data were collected and compiled & published in 41st annual report 2018-19 by National Horticultural Research and Development Foundation - New Delhi and others are calculated by using following formula. The study was done the gaps between the potential yield, state average yield and project yield with technology gap and technology index. The data on production cost input used, monitory return and gap in yield were collected and analysed for the economic feasibility of the recommended technology. In this study in which state obtained lowest crop yield treated as control.

Technology gap = Potential yield – State Average yield

$$\text{Technology index} = \frac{\text{Potential yield} - \text{demonstration yield}}{\text{Potential yield}} \times 100$$

$$\text{Cost benefit ratio} = \frac{\text{Total Gross return}}{\text{Total cost of production}}$$

The farmers involved in demonstration/ trainings were facilitated by NHRDF experts/ scientist in performing field operations like nursery sowing, transplanting, irrigation, spraying, weeding, harvesting etc. during the course of training and visit. The cost of production collected from concern state NHRDF centre by the farmer's perception with other methods by experts and compiled and published by NHRDF, New Delhi.

Table 2: Cost of production of Rabi onion bulb during 2018-19

Operation/Item	Gujarat	MH	MP	Tamil Nadu	Punjab	Karnataka	Haryana	UP	Bihar	Rajasthan	AP	Odisha
Land rent (6 month)	15000	12000	18000	40000	15000	15000	55000	15000	20000	25000	30000	10000
Seed cost (Rs)	12000	8000	11000	11000	10000	12000	11000	10000	10000	10000	9000	8000
Land preparation	11700	17525	8000	19000	14900	13900	10000	12900	8700	10000	10400	8400
Nursery raising	3480	8175	5000	4000	1200	800	3200	4700	14000	6000	5000	5600
Manures & Fertilizers	24330	27018	17515	24874	21751	19018	14200	8685	27950	15345	21100	17000
Transplanting	9650	23250	18000	12150	10000	7500	11000	15000	18000	12400	16000	14000
Weeding & hoeing	11065	11300	9750	18350	6000	13500	13000	17000	18000	9000	9750	19600
Plant protection	3200	20000	8150	14750	13500	13000	3000	14140	11288	5155	9165	4200
Irrigation	25000	15100	10000	9600	3600	8400	4200	12600	18000	8500	11000	8400
Harvesting, curing, sorting, grading & packing	8750	34000	36000	27195	12000	9000	12375	22500	26250	31100	32700	42000
Transportation	16575	1950	10000	6570	6000	6000	6000	7200	7500	10000	6000	5600
Overhead charges	2000	-	300	2628	2000	2000	2500	-	2000	4000	2000	3000
Supervisory charges	2500	15060	5000	15000	3000	3000	3000	-	3000	5000	5000	6000
Total	145250	193378	156715	205117	118951	123118	148475	139725	184688	151500	167115	151800
Bank interest	2542	3384	2743	3590	5948	6156	2598	2445	9234	7575	5849	5313
Grand Total of production cost (Rs)	147792	196762	159458	208707	124898	129274	151073	142170	193922	159075	172964	157113
Average yield @ (q/ha)	258	250	280	175	245	250	225	260	300	225	270	250
Final production (Rs/q)	574	787	569	1193	510	517	671	547	646	707	641	628

Source: Data based on 41st Annual report 2018-19, published by National Horticultural Research and Development Foundation- New Delhi.

RESULTS AND DISCUSSION

In this study, identified onion crop yield & productivity gap between different states of India which is influences the productivity of the country. The yield data regarding bulb yield of onion crop, technology gap, technology index, net return and cost benefit ratio of onion crop during 2018-19 were presented in Table 3 & 4 and cost of production in table 2.

The data regarding crop yield of onion crop presented in table 2 & 4, it was revealed that, the highest average yield of state was observed in Bihar state 300 q/ ha followed by Maharashtra (280 q/ha), Andhra Pradesh (270 q/ha), Uttar Pradesh (260 q/ha) and in Gujarat state (258 q/ha) and lowest yield was observed in Tamil Nadu state (175 q/ha) against maximum cost of production Rs 2087070.00 per ha with maximum highest production cost Rs 1193.00 per quintal followed by Haryana and Rajasthan state (225 (q/ha). Maximum cost of production was recorded in Tamil Nadu Rs 208707.00 per ha followed by Bihar Rs 196922.00, Maharashtra Rs 196762.00 and Andhra Pradesh Rs 172964.00 per ha, whereas lowest in Punjab Rs 124898.00, Karnataka Rs 129274.00, Uttar Pradesh Rs 142170.00 and Gujarat Rs 174792.00 per ha. It was also revealed that the production of one quintal onion maximum expenditure occurred on cultivation in Tamil Nadu Rs 1193.00 per quintal followed by Maharashtra Rs 787.00, Rajasthan Rs 707.00 and Haryana Rs 671.00 per quintal of onion, whereas minimum expenses occurred in Punjab Rs 510.00 followed by Karnataka Rs 517.00 Uttar Pradesh Rs 547.00 and Gujarat Rs 574.00 per quintal. The variation in technology gap between states may be due to varied soil fertility, climatic condition of the area and management practices implemented by the farmers, knowledge of farmers regarding improved varieties/ practices. Hence more location specific recommendations and precise use of technology in the field are necessary to bridge the technology gap as supported by Gupta and Singh (2010). Maximum technology gap was recorded in Tamil Nadu state in 175.00 q/ha, followed by Haryana/Rajasthan 125 q/ha and Punjab 105 q/ha, whereas minimum in Bihar 50 q/ha followed by Madhya Pradesh 70.00, Andhra Pradesh 80.00 and Uttar Pradesh 90 q/ha. The results are in conformity with the findings of Kumar et al. (2010) and Kumar et al. (2018). The technology index shows the feasibility of the technology at farmer's field and adoption sincerity of the farmers in state. The lower value of technology index more is the feasibility. Table 3 revealed that the technology index was minimum in Bihar 14.29% followed by Madhya Pradesh 20.00%, Andhra Pradesh 22.86%, Uttar Pradesh 25.71 % and Gujarat 26.29 %, whereas maximum in Tamil Nadu 50% followed by Haryana/ Rajasthan 35.71% and Punjab 30.00%. It was also observed from table no-1 that obtained state average yield was higher than the state productivity that is due to awareness in practices/ programme, which was running during period. The data obtained regarding cost benefit ratio all the 12 states of India were presented in Table 4. It is revealed that monetary returns were directly influenced by the market price of onion bulbs and cost of production during the year and production as well as productivity of the state. It is revealed that the higher net monetary returns of Rs 176542 .00 in Madhya Pradesh followed by Karnataka Rs 170726.00, Uttar Pradesh Rs 169830.00, Punjab Rs 169102.00 and Bihar Rs 166078.00, whereas lowest in Tamil Nadu Rs 1293.00 followed by Maharashtra Rs 103238.00, Rajasthan Rs 110925.00 and Haryana Rs 118927.00 and it

was due to maximum expenses incurred on cost of production and use of un balance agri inputs , it can be increase by reduces the un necessary & over expanses on un balances use of chemicals & fertilizers with pesticides . Similarly highest B: C ratio was observed in Punjab 2.35 followed by Karnataka 2.32, Madhya Pradesh 2.11, Uttar Pradesh 2.19 and Gujarat 2.09, whereas lowest cost benefit ratio was observed in Tamil Nadu 1.01 followed by Maharashtra 1.52, Rajasthan 1.70 and Bihar 1.86. Means adoption lack of technologies as well as use of un balance chemicals, fertilizers and pesticides. These findings are confirmation with the findings of Heremath and Nagraju (2010), Heremath and Hilli, (2012). It was concluded that gap of yield between state and differences from potential can be make up by more emphasis on disseminate to awareness regarding technologies and improved cultivation practices to states where more gap of yield was observed with avoid to un necessary expenses incurred by farmers. Planning of crop demonstrations as well as trainings is an effective extension mean to disseminate the proven technology at farmers level and to bridge the yield gap that increase the crop yield, monetary returns and livelihood status of the farming community. These finding are also benefited to planners for making the plans at a planning time.

Table 3: Yield gap, technology gap, and technology index of onion crop in different states of India during 2018-19

States	Potential yield (Q/ha)	Av. Yield of state (Q/ha)	Production cost Rs/ Q	Technology gap (Q/ha)	Technology Index (%)
Gujarat	350	258	574.00	92	26.29
Maharashtra	350	250	787.00	100	28.57
Madhya Pradesh	350	280	569.00	70	20.00
Tamil Nadu	350	175	1193.00	175	50.00
Punjab	350	245	510.00	105	30.00
Karnataka	350	250	517.00	100	28.57
Haryana	350	225	671.00	125	35.71
Uttar Pradesh	350	260	547.00	90	25.71
Bihar	350	300	646.00		14.29
Rajasthan	350	225	707.00	125	35.71
Andhra Pradesh	350	270	641.00	80	22.86
Odisha	350	250	628.00	100	28.57

Table 4: Comparison of economic returns of onion production with cost benefit ratio obtained from different states of India during 2018-19

States	Cost of Production (Rs/ha)	State average Yield Q/ha	Gross return (Rs/ha)	Net return (Rs/ha)	C: B ratio
Gujarat	147792.00	258	309600.00	161808.00	2.09
Maharashtra	196762.00	250	300000.00	103238.00	1.52
Madhya Pradesh	159458.00	280	336000.00	176542.00	2.11
Tamil Nadu	208707.00	175	210000.00	1293.00	1.01

States	Cost of Production (Rs/ha)	State average Yield Q/ha	Gross return (Rs/ha)	Net return (Rs/ha)	C: B ratio
Punjab	124898.00	245	294000.00	169102.00	2.35
Karnataka	129274.00	250	300000.00	170726.00	2.32
Haryana	151073.00	225	270000.00	118927.00	1.79
Uttar Pradesh	142170.00	260	312000.00	169830.00	2.19
Bihar	196922.00	300	360000.00	166078.00	1.86
Rajasthan	159075.00	225	270000.00	110925.00	1.70
Andhra Pradesh	172964.00	270	3240000.00	151036.00	1.87
Odisha	157113.00	250	300000.00	142887.00	1.91

** @ Rs 1200/- per quintal sorted/graded onion bulb & Rs 900/- per quintal Un sorted/graded onion bulb market rate.

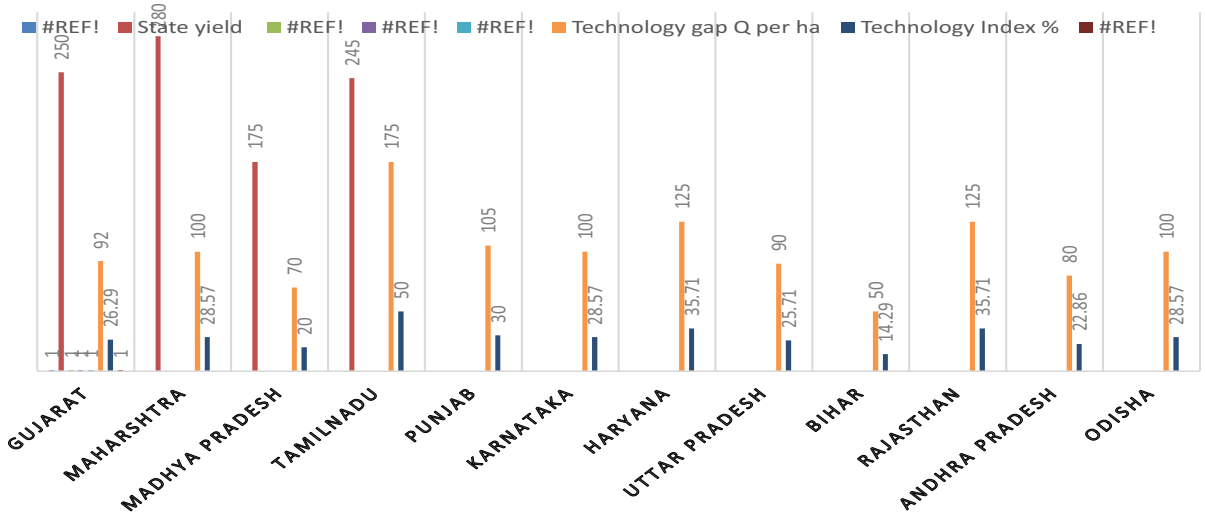

Fig. 1: Onion production of different states of India during 2018-19

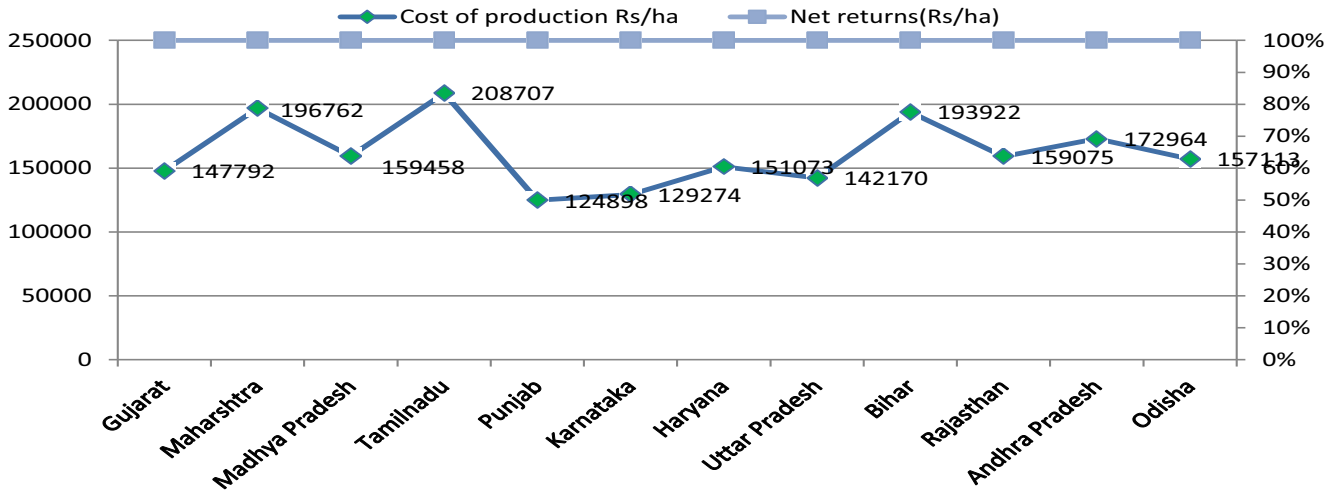

Fig. 2: Comparison of returns onion cultivation for all 12 states during 2018-19

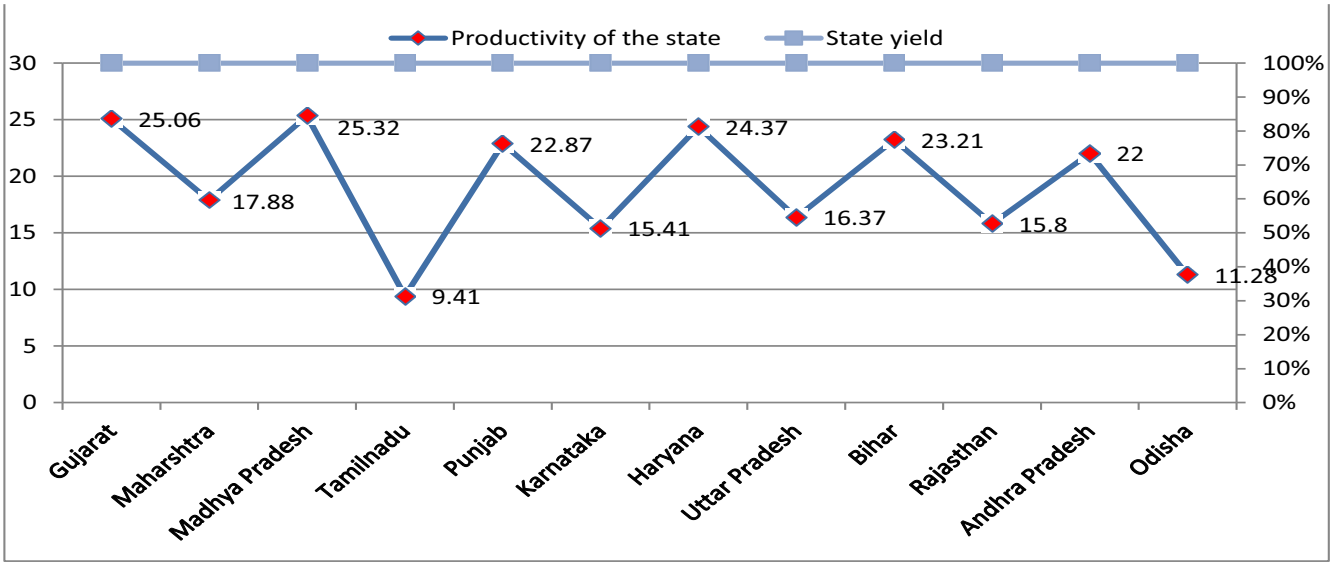

Fig. 3: Comparisons of average onion production of different states on productivity of the India during 2018-19.

CONCLUSION

The study highlighted significant variations in onion productivity, cost of cultivation, and technology adoption across twelve Indian states during 2018-19. Bihar achieved the highest yield with minimal technology gap and index, indicating strong feasibility and farmer adoption. In contrast, Tamil Nadu reported the lowest yield and highest production costs, reflecting limited technology assimilation. Demonstrations and farmer trainings under the National Horticulture Mission effectively promoted integrated crop management. Bridging yield gaps through targeted extension, awareness, and technology dissemination is crucial. Strategic planning of demonstrations and capacity-building programs can enhance productivity, improve returns, and uplift the livelihood of onion growers nationwide.

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