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RESEARCH ARTICLE :

Enhancement of pulse production through front line demonstrations

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SUMMARY : Field demonstrations were conducted in *Rabi* and *Kharif* season 2015-16 and 2016-17 at Rajapur, Muradnagar and Loni block of Ghaziabad district U.P. under NFSM programme to evaluate the productivity of pulse of different varieties of pigeonpea, blackgram and lentil. It was found that the average yield 15.025 q/ha of Pusa 991 was significantly higher than other varieties, which was 9.76 per cent higher as compared to farmers practice and the net profit was calculated Rs. 1,03,240 per ha. Whereas the average yield 14.20 q/ha was recorded in Pant urd 31 which was found highest in all varieties and it was calculated as 13.24 per cent better as compared to farmers practice (PDU 1) and net profit was recorded as Rs. 71000 / ha. Similarly the average yield obtained from Pusa masoor 5 was 14.91 q/ha which was 28.91 per cent higher than the 4147 (Farmer practice) and net income obtained was Rs. 69778/ha.

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KEY WORDS :
Variety, Yield, Net income, Cost benefit ratio

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BACKGROUND AND OBJECTIVES

Pulses are wonderful gift of nature and are rich source of protein, specially for vegetarian. About 90 per cent of the global pigeonpea and 37 per cent lentil area falls in India. Being rich in protein (22 - 23 %) pigeonpea is a good source of nutrition to the predominantly vegetarian population of our country. It is mostly consumed in the farm of dal (split cotyledons) ,annual leguminous crop yielding between one and 12 grains or seeds of variable size, shape and colour within a pod used both food and feed. Besides serving as important source of protein for large portion of the country population, pulses contribute to healthy soils and climate change mitigation through their nitrogen fixing properties. Pulses account for around 20 per cent of the area under food grains and contribute around 7-10 per cent of the total food grain production in the country. Area under pulse production is around 23.82 million hectare and production is around 15 to 16 million tons. Productivity of crop is lower because of unavailability of good quality of seed, package of practices, management of crop and non-adoption of plant protection measures. Production of pulses in U.P. in the year 2010 – 11 was 447883 ton, whereas in Ghaziabad district total production

was163 ton, it was 0.04 per cent of state pulse production. Government of India production target was 32 million tons with productivity of 850 kg/hectare in year 2011-12. Therefore, it is necessary to demonstrate the varieties of higher yield with complete package of practices and plant protection measures. Therefore, demonstrations were organized with following objectives,

– To demonstrate the high yielding varieties with recommended dose of fertilizers.

– Analysis of results obtained from demonstrations.

– To collect the reactions of the farmers for betterment of research and extension activities.

RESOURCES AND METHODS

Frontline demonstrations were conducted on pigeonpea, blackgram and lentil by KVK Muradnager in village Shobhapur, Rawali and Siraura in Ghaziabad district (28.6692^0 N latitude and 77.4538 ^{0} Elongitude). Demonstrations were carried out with three varieties of pigeonpea (Pusa Arhar 991, Pusa Arhar 992 and Upas120), blackgram (PDU -1, Uttara and Pant urd 31) and lentil (Pusamasoor -5, Pusamasoor -8 and 4147) in *Kharif* and *Rabi* 2015-16 and 2016-17. All the agronomical practices kept same in all the treatments and the demonstrations were supervised by KVK scientists on every operation. Extension programme were also organized *i.e.* field day and group discussions time to time. Critical inputs were provided by the centre. Data were collected for analysis of results.

OBSERVATIONS AND ANALYSIS

Demonstrations were conducted on recommended varieties of Pusa Arhar 991, Pusa Arhar 992 and UPAS-120 (Farmers practice) in *Kharif* 2015 and 2016, results were shown in Table 1. Yield of crop, percentage increase in yield, net income and benefit cost ratio were analyzed. Table shows that the yield of Pusa 991 was found maximum 15.20 q/ha in 2015 and 14.85 q/ha in 2016, increase in yield were obtained as 10.14 per cent in 2015 and 19.76 per cent in 2016, respectively as compared to UPAS 120 (check). Whereas the yield of Pusa Arhar 992 received as 14.50 q/ha in 2015 and 13.60 q/ha with increase in yield were 5.72 per cent in comparison to UPAS 120. Similarly the net income obtained from Pusa 991 in 2015 was maximum in both the year and in all three varieties as Rs. 103240.00. However, the Pusa 992 and Upas 120 in 2015 were Rs. 98200.00 and Rs. 94060 which was also maximum in both the year. Similarly benefit cost ratio were also maximum in Pusa 991 as 6.4:1 whereas Pusa 992 and UPAS 120 calculated as 6.4:1 and 6.1:1 in the year 2015.

Results of demonstrations of pigeonpea varieties Pusa Arhar 991, Pusa Arhar 992 and UPAS 120 on effect of zinc sulphate on yield is shown in Table 2. The yield

Table 1 : Evaluation of recommended varieties of pigoenpea

Crop/Season	Village/Block	Varieties	Area (ha)	Yield q/ha	%Increase in yield
Pegionpea/*Kharif* 2015	Shobhapur, Rajapur	Upas 120	0.40	13.80	0
	Rawali, Muradnager	Pusa Arhar 991	0.40	15.20	10.14
	Siraura, Loni	Pusa Arhar 992	0.40	14.50	5.72
Pegionpea/*Kharif* 2016	Shobhapur, Rajapur	Upas 120	0.40	12.40	0
	Rawali, Muradnager	Pusa Arhar 991	0.40	14.85	19.76
	Siraura, Loni	Pusa Arhar 992	0.40	13.60	9.67

Gross income (Rs./ha)	Net income (Rs./ha)	Benefit cost ratio
Kharif 2015		
109360	94060	6.1:1
119440	103240	6.4:1
114400	98200	6.1: 1
Kharif 2016		
89280	73980	4.8:1
106920	90720	5.6:1
Come	81720	5.04:1

of crop, per cent increase in yield, net income and benefit cost ratio were analysed. Table shows that the yield of Pusa 991 was found maximum as16.41 q/ha in 2015 which was 17.96 per cent higher over without zinc sulphate.Whereas, the yield of Pusa 992 and UPAS 120 were obtained as 15.65 q /ha and 14.90 q/ha, respectively which is 7.93 per cent and 7.97 per cent additional yield than the without zinc sulphate. Similarly the yield of Pusa Arhar 991was obtained as 14.85 q/ha in 2016 which is also found maximum in all varieties with 9.75 per cent increase in yield. Whereas the yield of Pusa 992 and UPAS 120 were obtained as 14.83 q /ha and 13.52 q/ha, respectively which is 9.69 per cent and 9.03 per cent higher than the without zinc sulphate.

Demonstrations were conducted on recommended varieties of blackgram of PDU-1(Farmers practice), Uttara and Pant Urd -31 in *Kharif* 2015 and 2016, results were shown in Table 3. Yield, percentage increase in yield, net income and benefit cost ratio were analyzed. Table shows that the yield 14.20 q/ha in 2015 was found maximum in Pant Urd -31 in all varieties. Whereas the yield of Uttara and PDU-1 were recorded as 13.30 and 11.02q/ha, respectively. The percentage increase in yield was found 22.50 per cent over PDU-1 (farmers practice)

Table 2 : Effect of zinc sulphate on yield of pigeonpea

***Kharif* – 2015**						
Variety	Yield q/ha		% Increase in yield	Gross income Rs./ha	Net income Rs./ha	Benefit cost ratio
	Zinc sulphate	Without zinc sulphate				
UPAS 120	14.90	13.80	7.97	7920	6420	4.28:1
Pusa Arhar 991	16.41	15.20	7.96	8712	7212	4.81:1
Pusa Arhar 992	15.65	14.0	7.93	8280	8780	5.52:1
***Kharif* - 2016**						
UPAS 120	13.52	12.40	9.03	8064	6564	4.41:1
Pusa Arhar 991	16.19	14.85	9.02	9648	8148	5.43:1
Pusa Arhar 992	14.83	13.60	9.04	8856	7356	4.90;1

Table 3 : Evaluation of recommended varieties of blackgram

Crop/Season	Village/Block	Variety	Yield q/ha	Gross income (Rs./ha)	Net income (Rs./ha)	Benefit cost ratio
Kharif 2015						
Blackgram	Rawali, Muradnager	PDU-1	10.50	0	51500	4-48:1
	Surana, Muradnager	Uttara	13.30	26.66	66200	4-49:1
	Shobhapur, Rajapur	Pant Urd -31	14.20	35.24	71000	5-00:1
Kharif 2016	Rawali, Muradnager	PDU-1	11-02	0	54600	4-74:1
	Surana, Muradnager	Uttara	12-55	13-88	61700	4-54:1
	Shobhapur, Rajapur	Pant Urd -31	13-50	22.50	66800	4-70:1

Table 4 : Effect of zinc sulphate on yield of blackgram

Kharif - 2015				
Yield q/ha		% Increase in yield	Net income (Rs./ha)	Benefit cost ratio
Zinc sulphate	Without zinc sulphate			
11.45	10.50	9.05	4260	2-95:1
14.51	13.30	9.09	5820	4-04:1
15.49	14.20	9.08	6300	4-37:1
***Kharif* - 2016**				
12-02	11-02	9-07	4560	3-175:1
13-69	12-55	9-08	5400	3-75:1
14-71	13-55	8-96	20	4-04:1

and the net income was also calculated as Rs. 71000/- in Pant Urd 31. Similarly in the year 2016 yield of Pant urd 31 was recorded maximum as 13.50 q/ha, which is 22.50 % higher as compared to PDU-1(Farmers practice). Whereas the yield of Uttara and PDU-1 were recorded as 12.55 and 11.02q/ha, respectively. The percentage increase in yield was found 22.50% over PDU-1 (farmers practice) and the net income was also calculated as Rs. 66800/- in Pant Urd 31.

Results of demonstrations of blackgram varieties Pant urd 31, Uttara and PDU-1 on effect of zinc sulphate on yield is shown in Table 4. The yield of crop, per cent increase in yield, net income and benefit cost ratio were analysed. Table shows that the yield of Pant urd 31 was found maximum as 15.49 q/ha in 2015 which was 9.08 per cent more over without zinc sulphate. Whereas the yield of Uttara and PDU-1 were obtained as 14.51 q /ha and 11.45 q/ha, respectively which is 9.09 per cent and 9.05 per cent higher than the without zinc sulphate. Similarly the yield of Pant urd 31 was obtained as 14.71 q/ha in 2016 which was also found maximum in all varieties with 8.96 per cent increase in yield. Whereas the yield of Uttara and PDU-1 were obtained as 13.69 q /ha and 12.02 q/ha, respectively which is 8.96 per cent and 9.07 per cent more than the without zinc sulphate.

Demonstrations were conducted on recommended varieties lentil of 4147 (Farmers practice), Pusa masoor-5 and Pusa masoor-8 in *Rabi* 2015 and 2016, results were shown in Table 5. Yield, percentage increase in yield, net income and benefit cost ratio were analyzed. Table shows that the yield of Pusa Masoor-5 was 14.91 q/ha in 2015 which is found maximum in all varieties. Whereas the yield of Pusa Masoor-8 and 4147 were recorded as 12.56 and 10.60 q/ha, respectively. The percentage increase in yield was found 28.91 per cent over 4147 (farmers practice) and the net income was also calculated as Rs. 69778/- in Pusa Masoor-5. Similarly in the year 2016 yield of Pusa Masoor-5 was recorded maximum as 14.62 q/ha which is 31.0 per cent more as compared to 4147 (Farmers practice). Whereas the yield of Pusa Masoor-8 and 4147 were recorded as 13.60 q/ ha and 11.16 q/ha, respectively. The percentage increase in yield of Pusa Masoor -8 was found 21.86 per cent higher over PDU-1 (farmers practice) and the net income was also calculated as Rs. 68096/- in Pusa moor -5 and found was maximum in all varieties.

Table 5: Evaluation of recommended varieties of lentil

Rabi- 2015

Crop/ Season	Village	Variety	Yield q/ha	% Increase in yield	Net income (Rs./ ha)	Benefit cost ratio
Lentil 2015	Rawali, Muradnager	4147 (Farmers practice)	10.60	-	46980	3.24:1
	Surana, Muradnager	Pusa Masoor-5	14.91	28.91	69778	4.18:1
	Shobhapur, Rajapur	Pusa Masoor-8	12.56	15.60	56848	3.55:1
Lentil 2016	Rawali, Muradnager	4147 (Farmers practice)	11.16	-	50228	3.46:1
	Surana, Muradnager	Pusa Masoor-5	14.62	31.0	68096	4.08:1
	Shobhapur, Rajapur	Pusa Masoor-8	13.60	21.86	62880	3.93:1

Table 6 : Effect of zinc sulphate on yield of lentil

Yield (q/ha)		% Increase in yield	Gross income	Net income	Benefit cost ratio
Zinc sulphate	Without zinc sulphate		(Rs./ ha)	(Rs./ha)	2.5:1
***Rabi* 2015**					
11.44	10.60	7.92	5040	3600	2.87:1
16.08	14.91	7.85	7020	5580	3.12:1
13.55	12.56	7.88	5940	4500	4.8:1
***Rabi* 2016**					
12.48	11.56	7.96	5520	4080	2.83:1
15.77	14.62	7.88	6900	5460	3.79:1
14.67	13.60	7.86	5460	4020	2.79:1

Results of demonstrations in *Rabi* 2015 and 2016 of recommended varieties of lentil 4147 (Farmers practice), Pusa masoor-5 and Pusa masoor-8 on effect of zinc sulphate on yield were shown in Table 6. The yield of crop, per cent increase in yield, additional income and benefit cost ratio were analyzed. Table shows that the yield of Pusa masoor-5 was found maximum as 16.08 q/ha in 2015, which was 7.85 per cent higher than without zinc sulphate .Whereas the yield of Pusa masoor-8 and 4147 were obtained as 13.55 q /ha and 11.44 q/ha, respectively which is 7.88 per cent and 7.92 per cent more than the without zinc sulphate. Similarly the yield of Pusa masoor-5 was obtained as 15.77 q/ha in 2016 which was also found maximum in all varieties with 7.88 per cent increase in yield. Whereas the yield of Pusa masoor-8 and 4147 were obtained as 14.67 q /ha and 12.48 q/ha, respectively which is 7.86 per cent and 7.96 per cent additional than the without zinc sulphate (Singh *et al.*, 2005 and Yadav *et al.*, 2005).

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