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RESEARCH ARTICLE

Constraints to Productivity of Black Gram (*Vigna mungo* L.) and Green Gram (*Vigna radiata* L.) in Tamil Nadu

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ABSTRACT

Pulses are important source of protein in India. Per capita requirement of Pulses (60 gm for male and 55 gm for female) is less than the availability (42 gm). Globally, India stands first in terms of area and production of Pulses. However, the Productivity is only 650 kg/ha, which is far below the world average productivity of 909 kg/ha. Black gram and Green gram account for about 71 per cent of the area in Tamil Nadu and the average yield level is less than the national average. Constraints limiting the Productivity are non-availability of High Yielding varieties, non-availability of quality seeds and low Seed Replacement Ratio (SRR).

Key Words: Pulses, Black gram, Green gram, Productivity, Constraints, Tamil Nadu

INTRODUCTION

Pulses are important source of protein. Dietary allowance recommended for adult male is 60 gm per day and for adult female it is 55 gm per day (Directorate of pulses Development, 2016). However, the per capita availability is only 42 gm per day. It calls for all out efforts to increase the per capita availability of Pulses. India has achieved first rank in World area (35 %) and production (25%) under Pulses; India has an area of about 25 million ha of Pulses producing 16.5 million tonnes of Pulses. This is 35% percent of the world area and 25% of world production (FAO,2016). However, the average yield level in India is 650 kg/ha against the world average of 909 kg/ha. In Tamil Nadu, Black gram (46%) and Green gram (25%) are the major Pulse crops accounting for about 71 percent of the area

under Pulses and the average yield level is far below the national average. Hence, efforts are needed to increase the productivity of Pulses.

MATERIALS AND METHODS

Secondary data was collected from published records to study the area, production and productivity. Based on the area under Pulses in different districts of Tamil Nadu, three top ranking districts were selected for Black gram and Green gram separately besides total Pulses. The districts selected were Cuddalore, Villupuram, Tiruvarur, Nagappattinam, Tirunelveli and Thoothukkudi. A sample of 240 farmers was randomly taken from each of the selected districts (thirty each from the districts) for studying the constraints limiting Production and Productivity of Black gram and Green gram using *ex post facto* design.

RESULTS AND DISCUSSION

Area, Production and Productivity of Pulses in India

Data relating to area, production and productivity of Pulses during 2001-2016 (Table 1) offer many insights. Area under Pulses during 2001-2002 was 22.01 million ha which grew steadily over years to reach 24.91 million ha during 2015-2016. The overall growth rate was only 0.37%.The production ranged from 11.13 million tonnes to 19.25 million tonnes with the mean production of 15.43 million tonnes. The overall growth rate of production during the period of study was 4.17 %.The productivity ranged from 543 Kg/ha to 789 Kg/ha with the mean productivity of 653.07 kg/ha. The decrease/increase in productivity over years as indicated by the growth rate that ranged between -9.9 to 3.4 and the mean was -9.5%. The wide fluctuation in the growth rate deserves attention. It may be concluded that the productivity level has to be increased and sustained over years.

Production and Productivity of Black gram and Green gram in India

Results relating to Area, Production and Productivity of Black gram (Urd) and Green gram (moong) during 2001-2016 are presented in Table 2. Area under Black gram during 2001-2002 was 33.03 lakh ha which grew steadily over years to reach 36.24 lakh ha during 2015-2016.The mean area under Black gram for the period was 31.89 lakh ha. The production ranged from 14.99 lakh tonnes to 19.71 lakh tonnes with the mean production of 15.62.The productivity ranged from 415 Kg/ha to 625 Kg/ha with the mean productivity of 488.93 kg/ha. The growth rate for the period was 1.98%.Area under Green gram during 2001-2002 was 30.87 lakh ha which grew steadily over years to reach 38.28 lakh ha during 2015-2016.The production of Green gram during the period ranged from was 6.92 to 18.00 lakh tonnes with the mean production of 15.61.The productivity ranged from 226 Kg/ha to 513 Kg/ha with the mean productivity of 394.53 kg/ha. The growth rate for the period was 7.11%. Area under Black gram and Green gram as well as the Production data also revealed fluctuations. Wide fluctuations reveal uncertainty in production.

Area, Production and Productivity of Pulses in Tamil Nadu

Results relating to area, production and productivity of Pulses in Tamil Nadu for the period 2001-2016 are presented in Table 3. The area ranged between 52.50 lakh ha and 88.70 lakh ha. The Production for the period ranged from 1.77 tonnes and 7.67 tonnes with the mean level of 3.12 tonnes. The Productivity for the period ranged from 303 kg/ha to 868 kg/ha. The mean productivity was 465.13 kg/ha.

Area, Production and Productivity of Black gram and Green gram in Tamil Nadu

Area, Production and Productivity of Black gram and Green gram in Tamil Nadu during 2001 -2016 are presented in Table 4. During 2001-2016, the area under Black gram ranged between 1.86 and 4.05 lakh ha.and the mean was 2.88 lakh ha. Similarly, the area under Green gram ranged from 1.08 to 2.39 lakh ha (Table 4) with the mean value of 1.58 lakh ha. Black gram production during 2001-2016 ranged from 0.71 lakh tonnes to 3.10 lakh tonnes with the mean value of 1.41 lakh tonnes. The Productivity of Black gram during 2001-2016 ranged from 240 kg/ha to 851 kg/ha and the mean value of productivity of Blackgram was 463.67 kg/ha. The Productivity of Green gram during 2001-2016 ranged from 227 kg/ha to 788 kg/ha and the mean value of productivity of Green gram was 450.40 Kg/ha.

Area under Black gram and Green gram and the district's share in the State during 2015-2016

Area under Black gram, Green gram and all Pulses in various districts of Tamil Nadu and their share in the State during 2015-2016 are presented in Table 5. During 2001-2016, the area under Black gram in the Tamil Nadu was 3.95 lakh ha and the area under Green gram was 2.38 lakh ha; Area under all Pulses was 8.87 lakh ha. Among all the districts cultivating Black gram in Tamil Nadu, Villupuram accounted for 17.97 % of the area followed by Tiruvarur (15.96%) and Cuddalore (13.25%). All these three districts accounted for 47.18% of the area devoted to Black gram.Similarly, among the districts cultivating Green gram in Tamil Nadu, Tiruvarur district accounted for 24.05 % of the area followed by Thoothukkudi (21.03 %) and Nagappattinam (17.56%). All these three districts accounted for 62.64 % of the area under Green gram. An area of 8.87 lakh ha is under Pulses in Tamil Nadu. Among all the districts, Tiruvarur accounts for a larger share of 13.58 % followed by Thoothukkudi (10.25 %) and Nagappattinam (9.42 %) districts. Top three districts cultivating black gram in larger area (Villupuram, Tiruvarur and Cuddalore) and Green gram (Tiruvarur, Thoothukkudi and Nagappattinam) were taken for further study.

Productivity of Black gram and Green gram in Selected Districts of Tamil Nadu

Respondents of the selected districts were interviewed to gather data on productivity of Black gram and Green gram and the results are presented in Table 6.The Table 6 reveals that the Productivity of Black gram in the selected districts ranged from 337 kg/ha to 598 kg/ha; the Productivity of Green gram ranged from 244 kg/ha to 602 kg/ha. The mean Productivity of Black gram in the selected districts was 502.66 kg/ha and for Green gram it was 437.33 kg/ha.

Constraints limiting Productivity of Black gram and Green gram in Selected Districts of Tamil Nadu

Constraints limiting Productivity of Black gram and Green gram in the selected districts were obtained from the respondents of the study and the results are presented in Table 7. The Table 7 reveals that all the respondents (100.00 %) mentioned non-availability of high yielding varieties as well as Low Seed Replacement or Varietal Replacement as the top most constraint followed by limited availability of labour. Non-availability of quality seeds, susceptibility to pests and diseases and lack of assured procurement and price were expressed as constraints by 91.67 % of the respondents. The Seed Replacement Ratio in the State is around 20 % for many years and this has to be improved. Drought or Moisture stress was expressed as a constraint by two-thirds of the respondents. Salinity/alkalinity was a problem for more than half the proportion of the respondents. Lack of life saving irrigation was the constraint for fifty per cent of the respondents. Vasanthakumar *et al*. (1987) reported non-availability of high yielding varieties and lack of quality seeds are the most important constraints. Narayan and Kumar (2015) reported that technology inadequacy and non-availability of essential inputs like quality seed and life saving irrigation constrained the productivity of Pulses.

CONCLUSION

Though India stands first in terms of area and production of Pulses, the Productivity is far below the world average productivity. The Productivity of Black gram and Green gram in Tamil Nadu is less than the national average. Wide fluctuations occurred in area, production and productivity of Pulses. Non-availability of high yielding varieties as well as Low Seed Replacement or Varietal Replacement emerged as the top most constraint followed by limited availability of labour. Non-availability of quality seeds, susceptibility to pests and diseases and lack of assured procurement and price were also the constraints for most of the respondents. It may be concluded that seed or varietal replacement coupled with availability of quality seeds might eliminate the constraints and the productivity of pulses would improve.

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Table 1.Area, Production and Productivity of Pulses in India during 2001 -2016

Year	Area in million ha	Growth Rate%	Production in million Tonnes	Growth Rate%	Productivity Kg/ha	Growth Rate%
2001-2002	22.01	1.6	13.37	4.1	607	2.3
2002-2003	20.50	-1.4	11.13	-3.4	543	-2.1
2003-2004	23.46	2.9	14.91	6.8	635	3.4
2004-2005	22.76	-0.6	13.13	-2.4	577	-1.8
2005-2006	23.39	-0.3	13.39	0.4	598	0.7
2006-2007	23.76	1.2	14.11	1.1	594	-0.1
2007-2008	23.63	-0.1	14.76	0.9	625	1.0
2008-2009	22.09	-1.3	14.57	-0.3	660	1.1
2009-2010	23.28	1.1	14.66	0.1	630	-0.9
2010-2011	26.40	2.7	18.24	4.9	691	1.9
2011-2012	24.46	-1.5	17.09	-1.3	699	0.2
2012-2013	23.25	-1.0	18.34	1.5	789	2.5
2013-2014	25.21	1.7	19.25	1.0	764	-3.1
2014-2015	23.10	8.5	17.16	5.1	728	-4.7
2015-2016	24.91	-6.7	16.35	-11.0	656	-9.9
Mean	23.48	0.37	15.43	4.17	653.07	-9.5

Source: http://eands.dacnet.nic.in/PDF/Glance-2016.pdf

Table 2.Area, Production and Productivity of Black gram (Urd) and Green gram (Moong) in India during 2001 - 2016

Year	Area in lakh ha		Production in lakh tonnes		Productivity Kg/ha			
	Black gram	Green gram	Black gram	Green gram	Black gram	Growth Rate %	Green gram	Growth Rate %
2001-2002	33.03	30.87	14.99	11.11	454	5.4	360	5.8
2002-2003	35.50	30.15	14.74	08.67	415	-8.5	288	-20.0
2003-2004	34.24	35.48	14.71	17.02	430	3.5	480	66.7
2004-2005	31.69	33.41	13.27	10.58	419	-2.6	317	-34.0
2005-2006	29.69	31.09	12.45	09.46	419	0.2	304	-3.9
2006-2007	30.67	31.94	14.43	11.15	470	12.2	349	14.7
2007-2008	31.88	37.27	14.57	15.23	457	-2.9	409	17.0
2008-2009	26.70	28.43	11.75	10.35	440	-3.7	364	-10.9
2009-2010	29.58	30.70	12.36	06.92	418	-5.1	226	-38.0
2010-2011	32.48	35.08	17.60	18.00	542	29.7	513	127.6
2011-2012	32.16	33.87	17.66	16.34	549	1.4	483	-6.0
2012-2013	31.53	27.19	19.71	11.86	625	13.8	436	-9.6
2013-2014	30.62	33.83	16.99	16.05	555	-11.3	475	8.8
2014-2015	32.46	30.19	19.59	15.03	604	8.8	498	4.9
2015-2016	36.24	38.28	19.45	15.93	537	-11.1	416	-16.4
Mean	31.89	32.52	15.62	15.61	488.93	1.98	394.53	7.11

Source: http://iipr.res.in/e-pulse-data-book-state-wise.html

Table 3.Area, Production and Productivity of Pulses in Tamil Nadu during 2001 -2016

Year	Area (in lakh ha)	Production (in lakh tonnes)	Productivity (in Kg/ha)
2001-2002	73.50	2.71	395
2002-2003	52.70	2.00	356
2003-2004	53.70	2.01	375
2004-2005	59.00	2.16	367
2005-2006	52.50	1.77	337
2006-2007	53.70	2.91	541
2007-2008	61.00	1.85	303
2008-2009	53.60	1.67	312
2009-2010	53.60	2.04	381
2010-2011	63.70	2.45	385
2011-2012	66.70	3.54	531
2012-2013	51.30	2.13	415
2013-2014	81.60	6.14	752
2014-2015	88.40	7.67	868
2015-2016	88.70	5.85	659
Mean	63.60	3.12	465.13

Table 4. Area, Production and Productivity of Black gram and Green gram in Tamil Nadu during 2001 -2016

Year	Area in lakh ha		Production in lakh tonnes		Productivity Kg/ha	
	Black gram	Green gram	Black gram	Green gram	Black gram	Green gram
2001-2002	2.89	1.29	1.26	5.80	435	451
2002-2003	2.04	1.08	0.79	3.69	390	342
2003-2004	1.86	1.26	0.76	5.33	409	424
2004-2005	2.34	1.23	1.02	5.33	436	435
2005-2006	2.16	1.37	0.71	4.59	329	336
2006-2007	2.51	1.34	1.23	7.98	490	595
2007-2008	3.08	1.59	0.74	4.79	240	302
2008-2009	2.62	1.39	0.79	3.14	301	227
2009-2010	2.60	1.38	0.99	4.76	380	344
2010-2011	3.19	1.97	1.27	7.20	398	368
2011-2012	3.57	1.89	1.86	9.90	521	524
2012-2013	2.74	1.25	1.16	3.54	423	283
2013-2014	3.65	1.95	3.10	1.51	851	775
2014-2015	4.05	2.33	2.65	1.83	653	788
2015-2016	3.95	2.39	2.76	1.34	699	562
Mean	2.88	1.58	1.41	4.71	463.67	450.40

Source: http://www.tn.gov.in/deptst/agriculture.pdf

Table 5. Area under Black gram, Green gram and all Pulses in various districts of Tamil Nadu and their share in the State during 2015-2016

District	Black gram		Green gram		All Pulses	
	Area (ha)	% share in State	Area (ha)	% share in State	Area (ha)	% share in State
Kancheepuram	1,521	0.38	442	0.18	2,043	0.23
Thiruvallur	1,531	0.38	7,949	3.33	10,139	1.14
Cuddalore	52,400	**13.25**	10,800	4.53	63,543	7.16
Villupuram	71,053	**17.97**	1,708	0.72	77,869	8.77
Vellore	2,984	0.75	2,628	1.10	31,464	2.57
Thiruvannamalai	12,840	3.25	1,075	0.45	22,784	2.57
Salem	6,866	1.74	16,094	6.74	63,980	7.20
Namakkal	2,811	0.71	9,037	3.78	16,028	1.80
Dharmapuri	6,398	1.62	2,369	0.99	51,710	5.82
Krishnagiri	2,542	0.64	1,394	0.58	47,645	5.36
Coimbatore	566	0.14	1,100	0.46	10,190	1.15
Thiruppur	2,584	0.65	2,496	1.04	17,385	1.95
Erode	1,189	0.31	641	0.27	5,777	0.65
Thiruchirappalli	9,265	2.35	1,037	0.44	14,349	1.82
Karur	4,125	1.05	697	0.29	16,138	1.82
Perambalur	828	0.20	4	0.00	1,633	0.18
Ariyalur	4,985	1.27	2	0.00	5,265	0.59
Pudukkottai	5,414	1.37	10	0.00	5,977	0.67
Thanjavur	19,018	4.81	6,260	2.62	25,317	2.85

Tiruvarur	63,116	15.96	57,463	24.05	1,20,584	13.58
Nagappattinam	41,676	10.55	41,936	17.56	83,612	9.42
Madurai	1,520	0.39	3,733	1.57	11,083	1.25
Theni	1,152	0.29	1,558	0.67	13,261	1.49
Dindigul	8,344	2.10	2455	1.02	29,296	3.30
Ramanathapuram	2,964	0.74	482	0.20	3535	0.40
Virudhunagar	4,227	1.06	7,845	3.29	13,573	1.53
Sivaganga	651	0.17	7	0.00	1225	0.14
Tirunelveli	21,760	5.50	7,393	3.09	30,299	3.41
Thoothukkudi	40,209	10.17	50,224	**21.03**	91,015	**10.25**
The Nilgiris	0	0.00	1	0.00	1	0.00
Kanniyakumari	917	0.23	2	0.00	930	0.10
Total	3,95,456	100.00	2,38,842	100.00	8,87,650	100.00
Mean	12,757	3.22	7704.58	3.22	28,634	3.20

Source: http://www.tn.gov.in/deptst/agriculture.pdf

Table 6. Productivity of Black gram and Green gram in selected districts of Tamil Nadu

S.N	District	Productivity (in Kg/ha)	
		Black gram	Green gram
1	Cuddalore	549	602
2	Villupuram	598	448
3	Tiruvarur	514	460
4	Nagappattinam	337	244
5	Tirunelveli	498	386
6	Thoothukkudi	520	484
	Mean	502.66	437.33

Table 7. Constraints Limiting Productivity of Black gram and Green gram in Selected Districts of Tamil Nadu

S.N	Constraints	Number of respondents	Percentage
1	Non-availability of high yielding varieties	240	100.00
2	Non-availability of quality seeds	220	91.67
3	Low Seed Replacement / Varietal Replacement	240	100.00
4	Susceptibility to pests and diseases	220	91.67
5	Drought/Moisture stress	160	66.67
6	Lack of life saving irrigation at critical stages of crop	120	50.00
7	Salinity/Alkalinity	124	51.67
8	No assured Procurement and Price	220	91.67
9	Limited availability of labour	240	100.00