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PERFORMANCE OF ENERGETICS AND ECONOMICS OF MUNGBEAN VARIETIES UNDER DIFFERENT DATES OF PLANTING IN *VERTISOLS* OF CHHATTISGARH PLAINS

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ABSTRACT

The present investigation entitled "Performance of energetics and economics of mungbean varieties under different dates of planting in Vertisols of Chhattisgarh plains" was carried out at Instructional Farm, IGAU, Raipur during kharif season of 2004. The soil of the experimental field was clayey in texture (Vertisols) locally known as "Bharri". The soil was neutral in pH and had low nitrogen and medium phosphorus and high in potassium content. The experiment was laid out in split plot design with three replications. The treatments consisted of four dates of sowing viz. 10th July (D_1), 25th July (D_2), 09 August (D_3) and 24th August (D_4) as main-plot treatment and twelve varieties viz., V_1 : TM-99-2, V_2 : Malviya Jyoti, V_3 : ML-5, V_4 : RM-03-71, V_5 : Pragya, V_6 : RM-06-08, V_7 : BM-4, V_8 : TM-2002-4, V_9 : ML-131, V_{10} : Pusa Vishal, V_{11} : TM-2000-1 and V_{12} : HUM-12 as sub-plot treatment.

Energy output, energy output: input ratio and energy use efficiency were maximum under 10th July sowing, while, lowest was recorded under 24th August sowing. The energy use efficiency was noted highest under variety HUM-12 followed by variety BM-4. The energy out and energy output:input ratio also followed the same trend in case of mungbean varieties.

The highest net realization (Rs. 4,380 ha^{-1}) and net realization rupee^{-1} invested (Rs 0.775) was noted under 10th July sowing. The variety BM-4 gave the highest net realization (Rs.3,683 ha^{-1}) and net realization rupee^{-1} invested (Rs. 0.65) which was closely followed by variety HUM-12.

KEYWORDS: Chhattisgarh Plains, pH Content, Estimation of Energetic and Economics Analysis

INTRODUCTION

Mungbean, is the important crop of Chhattisgarh. It occupies an area of 0.29 lakh ha with the production and productivity of 0.12 lakh tonnes and 425 kg ha^{-1}, respectively. The major districts growing mungbean in Chhattisgarh are Mahasamund (15.8% area), Durg (12.7%), Dantewara (11.7%), Kanker (11.1%) and Rajnandgaon (10.3%).

Climate which is practically impossible to be controlled has always been the most important factor in governing crop production. In a view to get maximum production, suitable varieties for specific region has to be given priority. On the other hand, sowing of crops on different dates of a calendar year with different plant population provides an excellent opportunity to study as a low cost input, for getting higher yield (Das *et al.*, 1996).

Growth of a plant is an ultimate result of soil and environment. Some of the agronomic manipulation like shifting in sowing date and plant density play a vital role in final expression of growth. The normal sowing time *i.e.* last fortnight of June to first week of July depending on break of monsoon enlimits the maturity stage when there are rains in most of the years. This severely affects the quality of the produce, making the grains almost decayed within pod, which in turn, gives farmers a great loss whether marketed or consumed. Though, we cannot stand vis-a-vis to climate, certainly efforts can be made through some adjustment in date of planting and selection of proper cultivar to certain extent.

REVIEW OF LITERATURE

Energy studies

Singh *et al.* (1981) studied the energy requirement of paddy, cotton, maize and wheat and reported that all the crops consumed majority of energy and energy requirement of chickpea production in Madhya Pradesh, was 2336 and 5237 MJ ha^{-1} operation-wise and source-wise, respectively. Energy ratio was found 8.60 and specific energy was 4.76 MJ kg^{-1}. Sharma *et al.* (1998) from Sehore concluded that the total production energy requirement for chickpea production was estimated to be 3534 MJ ha^{-1} of which the operational energy was 1204 MJ ha^{-1}, the input out energy ratio was 6.65.

Guruswomy *et al.* (2001) while studying on energy requirements for crop production under dry land agriculture found that redgram, consumed maximum human and animal energy. The energy consumption were the highest for harvesting, tillage operation and sowing operation, whereas, the energy output through byproduct was more than the main product. The energy requirement for primary and secondary tillage operation was 444 MJ ha^{-1} and 125 MJ ha^{-1} for redgram. The operation-wise energy consumption was 1167 MJ ha^{-1} for redgram and 1176 MJ ha^{-1} for green gram crop.

The output energy of redgram for main and byproducts were 6321 MJ ha^{-1} and 23320 MJ ha^{-1}, respectively. The energy ratio of redgram and greengram was 4.37 and 4.20 for the main product, but for the byproduct it was 16.08 and 12.88, respectively. The total output input energy ratio was 20.45 for redgram followed by greengram, sorghum and sunflower.

Economics

Sharma *et al.* (1990) studied on the blackgram sown on two dates and given 0, 30, 60 or 90 kg P_2O_5 ha^{-1}. The economic optimum fertilizer rates, calculated by using an equation based on the price of the fertilizer and the produce were 52.85 and 42.52 kg P_2O_5 ha^{-1} for crops sown on 25 June and 15 July, respectively. Singh *et al.* (1993) studied the greengram and blackgram under no fertilizers with or without seed inoculation with *Rhizobium* and found that the net economic return was higher in blackgram and inoculation increased the economic return.

Pramanik *et al.* (2002) reported that significantly higher gross return, net return and more benefit: cost ratio were recorded through the cultivation of Narendra mung followed by PDM 54.

MATERIALS AND METHODS

Energy Studies

Energy input and output was calculated from sowing to harvesting of all the treatments. It was estimated in Mega Jule (MJ) ha^{-1} with reference to the standard value prescribed by Mittal *et al.* (1985). Energy efficiency and output-input ratio were calculated by using the following formula:

$$\text{Energy use efficiency (q MJ x } 10^{-3}) = \frac{\text{Total produce (q)}}{\text{Energy input (MJ x } 10^{-3})}$$

$$\text{Energy output-input ratio (EOIR)} = \frac{\text{Energy output (EO)}}{\text{Energy input (EI)}}$$

Economics

Cost of production for all treatments was worked out on the basis of the prevailing input and market price of the produce. The net realization ha^{-1} was calculated by deducing the cost of production ha^{-1} from the gross realization ha^{-1}.

Ultimately, net realization $rupee^{-1}$ invested was calculated treatment wise to assess the economic impact of the treatments by dividing the net realization ha^{-1} by the cost of production ha^{-1}.

RESULTS

Energetics

Data calculated on energetic parameters at harvest have been presented in Table 1. Sowing on 10th July gave the significantly the highest energy output through seed, stover and total biomass. The lowest value was recorded under 24th August sowing. Almost similar was the trend for energy output-input ratio and energy use efficiency for total biomass. As regards to varieties, the highest energy output, energy output-input ratio and energy use efficiency was observed in HUM-12 followed by BM-4. The lowest values were recorded under 24th August sowing and variety Pragya. The maximum value under said treatments was due to higher seed yield and total biomass. Similar observations were noted by Salam (2002).

Table 1: Energy Input and Output Relationship of Mungbean as Influenced By Dates of Sowing and Varieties

Treatment	Energy input, $MJx10^{-3}\ ha^{-1}$	Energy output, $MJ \times 10^{-3}\ ha^{-1}$			Energy Output Input Ratio	Energy use efficiency, q $MJ \times 10^{-3}\ ha^{-1}$	
		Seed	Stover	Total		Seed	Biomass
Dates of sowing							
D_1 : 10th July	4.004	7.43	15.33	22.76	5.68	1.26	4.32
D_2 : 25th July	4.004	6.35	13.17	19.52	4.87	1.07	3.70
D_3 : 09th August	4.004	4.04	8.75	12.79	3.19	0.68	2.42
D_4 : 24th August	4.004	2.13	5.02	7.15	1.78	0.36	1.36
Varieties							
V_1 : TM-99-2	4.004	5.36	11.65	17.01	4.24	0.91	3.23
V_2 : Malviya Jyoti	4.004	4.42	9.41	13.83	4.45	0.75	2.63
V_3 : ML-5	4.004	4.23	9.27	13.50	3.37	0.71	2.56
V_4 : RM-03-07	4.004	6.39	12.88	19.27	4.81	1.08	3.65
V_5 : Pragya	4.004	3.36	7.57	10.93	2.72	0.57	2.08
V_6 : RM-06-08	4.004	6.14	12.87	19.01	4.74	1.04	3.61
V_7 : BM-4	4.004	6.93	13.91	20.84	5.20	1.17	3.94
V_8 : TM-2002-4	4.004	3.86	8.51	12.37	3.08	0.65	2.35
V_9 : ML-131	4.004	3.89	8.75	12.64	3.15	0.66	2.40
V_{10} : Pusa Vishal	4.004	4.58	9.68	14.26	3.56	0.77	2.70
V_{11} : TM-2000-1	4.004	3.79	8.37	12.16	3.03	0.64	2.31
V_{12} : HUM-12	4.004	6.89	13.96	20.85	5.20	1.17	4.09

Economics

Economics of mungbean production in terms of gross and net returns and benefit cost ratio were calculated for different sowing dates and varieties and the outcome is presented in Table 2. The data reveal that the maximum gross (Rs 10,028 ha^{-1}), net return (Rs.4,380 ha^{-1}) and net return per rupee invested (Rs 0.775) were obtained under 10th July sowing.

As the sowing is delayed, net return from the cost goes on decreasing. 24th August sowing was observed to be an enterprise of loss. Regarding varieties, BM-4 gave maximum return of Rs. 3,683 ha^{-1}. The cultivation of Pragya, TM-2000-1, ML 131 and TM-2002-4 was a matter of risk.

Table 2: Economics of Mungbean as Affected by Dates of Sowing and Varieties

Treatment		Cost incurred, Rs ha^{-1}	Yield, kg ha^{-1}		Gross realization, Rs ha^{-1}			Net realization	
			Seed	Stover	Seed	Stover	Total	Rs ha^{-1}	Re^{-1} invested
Dates of sowing									
D_1	: 10th July	5647.8	506	1227	9108	920	10028	4380	0.775
D_2	: 25th July	5647.8	432	1054	7776	791	8567	2919	0.516
D_3	: 09th August	5647.8	275	700	4950	525	5475	-172	-0.030
D_4	: 24th August	5647.8	145	402	2610	302	2912	-273	-0.484
Varieties									
V_1	: TM-99-2	5647.8	365	932	6570	700	7270	1622	0.287
V_2	: Malviya Jyoti	5647.8	301	753	5418	551	5969	321	0.056
V_3	: ML-5	5647.8	288	742	5184	557	5741	94	0.016
V_4	: RM-03-07	5647.8	435	1031	7830	773	8603	2956	0.523
V_5	: Pragya	5647.8	229	606	4122	455	4577	-1071	-0.189
V_6	: RM-06-08	5647.8	418	1030	7524	773	8296	2649	0.468
V_7	: BM-4	5647.8	472	1113	8496	835	9331	3683	0.652
V_8	: TM-2002-4	5647.8	363	681	4734	511	5245	-403	-0.071
V_9	: ML-131	5647.8	265	700	4770	525	5295	-352	-0.062
V_{10}	: Pusa Vishal	5647.8	312	775	5616	581	6197	550	0.097
V_{11}	: TM-2000-1	5647.8	258	670	4644	503	5147	-501	-0.088
V_{12}	: HUM-12	5647.8	469	1117	8442	838	9280	3631	0.643

Price of input : N @ Rs 11 kg^{-1}, P_2O_5 @ Rs 20 kg^{-1}, K_2O @ Rs 7.50 kg^{-1}, S @ Rs 21.27 kg^{-1}

Price of produce : Seed @ Rs 1800 q^{-1}, Stover @ Rs 75 q^{-1}

Total cost : Fixed cost + Miscellaneous cost

$$\text{Net realization rupee}^{-1}\text{ invested} = \frac{(\text{Gross realization} - \text{Total cost})}{\text{Total cost}}$$

CONCLUSIONS

The dates of sowing and varieties had a significant effect on yield ha^{-1}. The effect of dates of sowing was more pronounced and highest yield (506 kg ha^{-1}) was obtained under first date of sowing i.e. 10th July. The yield however, progressively and significantly decreased upto 09th August. Variety BM-4 gave the highest seed yield (475 kg ha^{-1}) which was followed by HUM-12. The interaction between dates of sowing and varieties was also found to be significant in affecting seed yield ha^{-1}. Significantly maximum seed yield ha^{-1} was in general, obtained in combination of first date of sowing 10th July with variety BM-4 or RM-03-07.

Energy output, energy output: input ratio and energy use efficiency were maximum under 10th July sowing, while, lowest was recorded under 24th August sowing. The energy use efficiency was noted highest under variety HUM-12 followed by variety BM-4. The energy out and energy output:input ratio also followed the same trend in case of mungbean varieties.

The highest net realization (Rs. 4,380 ha^{-1}) and net realization $rupee^{-1}$ invested (Rs 0.775) was noted under 10^{th} July sowing. The variety BM-4 gave the highest net realization (Rs.3,683 ha^{-1}) and net realization $rupee^{-1}$ invested (Rs. 0.65) which was closely followed by variety HUM-12.

REFERENCES

1. Das, S.N., Mukherjee, A.K. and Nanda, M.K. 1996. Effect of dates of sowing and row spacings on yield attributing factors of different varieties of Frenchbean (Phaseolus vulgaris). Agriculture Science and Digest 16(2): 130-132.

2. Guruswomy, T., Desai, R.S. and Weeranguda, M. 2001. Energy requirement for crop production under dry land agriculture in Karnataka : A case study. Karnataka Journal of Agriculture Science 14 (1) : 101-105.

3. Pramanik, S.C., Sagar, R.L., Ahmad, Z., Singh, B., Chaudhary, N.C. and Kanaklata 2002. On farm assessment of blackgram and greengram varieties in Bay Islands. Indian Journal of Agricultural Science 72 (4) : 241-242.

4. Salam, P.K. 2002. Studies on micronutrient fertilization in urdbean (P. mungo L.) grown under rainfed situation of unbunded Vertisols of Chhattisgarh plains M.Sc. (Ag) Thesis, IGAU, Raipur (C.G.).

5. Sharma, V.K., Bhopal, S. and Singh, B. 1990. Response and economic of phosphorus fertilization to blackgram under rainfed condition. Haryana Journal of Agronomy 6 (1) : 98-100.

6. Singh, C.P., Dhawan, K.C., Poneser, K.S. and Singh, B. 1981. An economic analysis of energy requirement and productivity of crop on the farm in the Punjab State. Journal of Agriculture Engineering 18 (12) : 1-10.