

Cultivate Summer Moong Instead of Spring Maize to Save Water

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The Punjab state having only 1.53 per cent of the total geographical area of the country produces about 15 per cent wheat and 11 per cent rice of the country. The two natural resources, water and soil are being exploited to a large extent. Water crisis in Punjab is a matter of serious concern. About 80 per cent of blocks of the state are over-exploited. In spite of this peculiar situation, the farmers in central plain zone of the state are still cultivating spring maize (*Zea mays* L.) after potato and pea during the months of February to June. Moreover, due to very high evaporative demand of the atmosphere during the months of April to June, the water requirement of this crop comes out to be very high. The farmers are cultivating maize hybrids developed by various public and private organizations to get higher output. They are ignoring the cost of irrigation water applied for raising the spring season maize crop because state government is providing electricity free of cost to the farm sector. The cost of irrigation water applied for raising the spring maize is not taken into account by the farmers because of free electricity to the farm sector. Therefore, the farmers should be sensible in choice of the crops for this season keeping in view the continuous decline of groundwater level in the state. As a result, the state farmers have to deepen their tube wells by investing huge amount of funds. Hence, it becomes essential to use the water by growing alternative short duration crops like summer moong. The moong (*Vigna radiata*) being a leguminous crop has a unique role in fixing atmospheric nitrogen through the process of biological nitrogen fixation. The biological nitrogen fixed by moong crop not only meets its own requirement but also leaves nitrogen for the next crop.

Comparative evaluation of summer moong and spring maize

The comparative analysis of performance of spring maize and summer moong revealed that an amount of Rs. 21636 per acre is required for the cultivation of spring maize in comparison to Rs. 11284 for summer moong. It is important to note that spring maize is a water intensive crop as its needs about 18 irrigations as compared to only three or four for

summer moong. It has been observed during the field surveys that farmers have to apply even more than 18 irrigations to spring maize. Summer moong is a short duration crop of about 70 days while spring maize matures in about 120 days. Hence, spring maize requires more than 3.5 times of irrigation water (4320 m³/per acre) than that of summer moong (1200 m³/per acre). Although, net returns from spring maize are higher than summer moong but the reverse is true when we take into account water productivity in terms of returns over variable costs. As from each cubic metre of water use, summer moong yields Rs. 24.6 and spring maize yields Rs. 10.4. This is mainly due to the huge difference in water requirements of both the crops. In simple words, the quantity of water used in spring maize to earn Rs. 1000 is worked out to be 95.8 cubic metres while in the case of summer moong, it is 40.6 cubic metres. Thus, the cultivation of summer moong in place of spring maize may help to conserve precious water and power resources of the state. It is also important to mention that there is saving of 35 kg/acre of urea (about Rs. 207/acre) to next paddy crop transplanted after the incorporation of the summer moong crop residue in the field.

Farmers are advised to follow the recommended package of practices in order to harvest maximum yield and thus net profit. It has been observed that there are certain critical periods during the growing period of summer moong crop at which any negligence may result in significant losses in the returns. For example, there may be the attack of thrip at the flowering stage and pod borer at the pod formation stage. If proper control measures are not taken up, then there may be a significant loss in the crop yield. Similarly, scheduling of irrigation plays a very important role in getting the crop uniformly matured for harvesting because if irrigation is continued after 60-65 days, the crop will keep on giving new flowers and pod setting. As a result of which, farmer may not decide when to harvest the crop. Hence, the irrigation water needs to be stopped after 50-55 days after sowing so that it can mature in 60-65 days.

Table 1: Comparative cost structure of spring maize and summer moong

(Per acre)

Variable Costs	Spring Maize		Summer Moong	
	Quantity	Value (Rs)	Quantity	Value (Rs)
1. Seed & Seed Treatment				
i) Seed (Kg)	10	2000	15	2250
ii) Seed treatment - Bavistin/Captan (g)	30	28	45	34
Sub Total	-	2028	-	2284
2. Fertilizers	-	2019	-	965
3. Plant protection	-	640	-	360
4. Irrigations (No.) *	18	1800	4	400
5. Human labour (Hours)	105	6300	32	1920
6. Tractor use	5	3200	6	3840
7. Combine harvesting	-	5000	-	1400
8. Marketing charges	-	382	-	61
9. Interest on variable costs @ 5% for half the crop period	-	267	-	54
Total variable costs (1 to 9)	-	21636	-	11284

*Assuming free electricity to farm sector in Punjab

Table 2: Comparative returns and water use efficiency of spring maize and summer moong

S. No.	Particulars	Unit	Spring Maize	Summer Moong
1.	Average productivity	q/acre	30	4.7
2.	Gross returns	Rs/acre	66750	40805
3.	Total variable costs	Rs/acre	21636	11284
4.	Returns over variable costs (ROVC)	Rs/acre	45114	29521
5.	Water used for irrigations	m ³ /acre	4320*	1200**
6.	Water productivity	kg/m ³	0.7	0.4
7.	Water productivity at ROVC	Rs/m ³	10.4	24.6
8.	Water use and income (ROVC) ratio	m ³ /1000 Rs	95.8	40.6

Note: An additional benefit due to the saving of 35 kg/acre urea of about Rs 207/acre to next paddy crop on account of summer moong crop residue incorporation in the field.

Conclusion

Summer moong being a leguminous crop fixes atmospheric nitrogen in the soil, thus helps in maintenance of soil fertility. However, the cultivation of spring maize may cause the depletion of

*Based on ridge sowing, **Based on flat sowing groundwater which is a precious natural resource. It also puts financial burden on the state government on account of high electricity consumption provided free to the farmers. Therefore, farmers must be sensible in selection of crops. In Punjab especially in the central plain zone, the existing crop rotation of paddy-potato-spring maize needs to be replaced by paddy-potato-summer moong. This will help in sustenance of both soil and water resources.
