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Risk management in agriculture in western part of Rajasthan

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Abstract

Inspite of tremendous progress made in the field of Agriculture since independence the risk factor continues to play an important role. This factor assumes greater importance in dry land farming areas. The western Rajasthan poses a typical picture due to low, erratic and unevenly distributed rainfall pattern and unavailability of alternative irrigation sources. The coefficient of variation of rainfall is 40 percent. In view of the above, performance of 6 Pearlmillet varieties was evaluated in two villages of Jodhpur district by randomly selecting 10 adopter and 10 non-adopter farmers. It was noticed that the wider row spacing technology recommended to the farmers resulted in conserving soil moisture, maintaining soil fertility, reducing plant protection expenditure to zero level and high B:C ratio. It is suggested that research efforts should be intensified to come out with more such technologies for the dry farming and rain fed areas.

Key words: Dry land farming, B:C ratio, soil fertility, soil moisture

Introduction

Indian agriculture has, since independence made rapid strides. In taking the annual food grain production from 51 million tonnes of the early fifties to 206 million tonnes at the turn of the century, it has contributed significantly in achieving self-sufficient in food and in avoiding food shortages in our country. The pattern of growth of agriculture has, however, brought in its wake, uneven development, across regions and crops as also across different sections of farming community and is characterized by low level of productivity and degradation of natural resources in some areas. Capital independency, lack of infrastructure support and demand side constraints such as controls on movement, storage and sale of agriculture products etc. have continued to affect the economic viability of agriculture sector. Consequently, the growth of agriculture has also tended to slacken during the nineties. Agriculture has also become a relatively unrewarding profession due to generally unfavorable yield and price structure causing abandoning of farming and increasing migration from rural areas.

About 68% Indian farmers and farm workers have been the backbone of Indian Agriculture. Despite having achieved national food security the well being of the farming community continues to be matter of grave concern for the planners and policy maker's in the country. Also the Government accords abiding importance to improving the quality of the country's land and soil resources.

Rajasthan is the largest state covering 10.4 percent of land mass of the country. The water resources endowment of the state is only one per cent of the available water resources in the country. The livestock population of the state is almost equal (5.4 crore) to the human population, which is also increasing fast with annual growth rate of 2.8 percent. The ground water resources is depleting fast in most areas in the state and declaration of dark zone is on the increase.

In this background, cost effective measures for development of agriculture have to be taken in Rajasthan. Accordingly, profarmer research programmes also need to be initiated and strengthened wherever necessary.

More than 70 percent of cultivated area in the state is rain fed. The western Rajasthan is the worst hit area because of very low and erratic rains in most years. Not only the crop yields are low but the problem of fodder is also very serious in this region. Bajra, guar and moth are the major Kharif crops grown in western Rajasthan. Selections of short duration drought tolerant varieties of crops are, therefore, necessary for successful crop production.

In the present study, an attempt was made to evaluate the impact of the on farm research for increasing the productivity of pearl millet in arid region of Rajasthan.

Materials and Methods

Selection of district

Jodhpur district was selected purposely because research in wider row spacing technique was conducted there.

Selection of Village

Two villages, one having adopter and other having non adopter of the technology were selected purposely.

Selection of Farmer

10 adopters and 10 non-adopters of the technology were selected randomly for the purpose of primary data collection.

In varietal trial, six varieties of pearlmillet namely HHB-67, ICMH-356, MH-169, RHB-121, ICTP-8203 and a local variety. Cluster bean variety RGC-936 and a local variety were selected for evaluating the performance of pearlmillet alone and also mixed with cluster bean during 2009-10. The research problem addressed and interventions made in the study were:

1. Rainfall in the zone is very scarce and uneven. Drought is common occurrence and chances of crop failure are very high in the area. An attempt is made to develop to drought resistance varieties of pearl millet and suitable agronomic practices to sustain productivity.
2. Evaluation of drought tolerant varieties for grain and fodder purpose.

· Evaluation of different techniques of moisture conservation and sustainable soil fertility maintenance.
· Selection of varieties suitable for intercropping/mixed cropping system.

Wider row spacing Techniques

Ridge and furrow making after 30 days of showing. Wider row spacing 60cm. instead of 30cm. As in traditional practices with 50% recommended dose of Nitrogen through fertilizer and 50% through organic manure showed superiority over farmers field. The following impact indicators were selected:

1. Crop Production

Grain yield and Fodder yield

2. Quality Improvement

Boldness of grain and Shinning

3. Soil Improvement

Soil fertility, Moisture conservation and Plant growth

Results and Discussion

Table 1 indicates that in varietal trial the variety ICMH-356 gave 75% more yield and 75% more fodder over local variety.

Table 1 : Evaluation of varieties for drought tolerance

Varieties	Grain yield (kg/ha)	Index	Fodder yield (kg/ha)	Index
HHB-67	1549	139.6	1977	115.2
ICMH-356	1708	153.9	2250	131.1
MH-169	1622	146.1	2035	118.6
RHB-121	1619	145.9	2301	134.1
ICTP-8203	1110	100.0	1716	100.0
Local	1380	124.3	1886	109.9

Table 2 indicates cost figures obtained from adopter of technology & non-adopters of technology depicts that the farmers can harvest around Rs. 4000/- additional income by investing nearly Rs. 500/- more on adopting new technology. By conserving soil moisture & maintaining soil fertility, no irrigation is required a key achievement of the study. No expenditure on plant protection in case adopter is the favourable impact of technology. 't' Test was used in order to adopter and non-adopter of the technology. The result indicate that adopter were highly significant on non adopter. B:C ratio calculated was 7.7:1.

Table 2: Evaluation of different techniques of moisture conservation and sustainable soil fertility maintenance

(In Rupees)

Particulars	Without technology	With technology	%change overwithout technology
Seed	116(3.56)	75(1.50)	-53.13
FYM	587(13.07)	834(16.67)	+42.05
Fertilizer	-	394(7.88)	+100
Plant protection	11(0.24)	-	-100
Irrigation	381(8.47)	-	-100
Human labour	1950(43.41)	2000(39.97)	+2.55
Machine cost	1404(31.25)	1700(33.98)	+21.09
Total cost	4493(100)	5003 (100)	+11.36
Output main product	5329.07	9370	+75.83
Output by product	1487	1900	+27.98
Total returns	6816	11270	+65.35
Net returns	2323	6267	+169.78

(Figures in parenthesis are the percentage of the total cost)

Table 3: Identification of cultivars for pearlmillet based mixed cropping system

Varieties	PM equivalent Yield	Index
Raj 171 + Local	3052	100.0
Raj 171 + RGC-936	3980	130.4
ICMH-356 + Local	3305	108.3
ICMH-356 + RGC-936	4199	137.6

Pearlmillet variety icmh-356 mixed with cluster bean variety RGC-936, gave higher grain yield. Cluster beans variety RGC-936 gave significant higher yield over local variety in both the pearl millet varietal combinations.

Table 4 indicates that as a consequence of adoption of technique, which encourages soil moisture conservation improves soil fertility. The response of the adopter clearly showed satisfaction. Adopter responded that there is a positive impact of the technology with respect to soil texture and moisture and it saves time and gives better quality of output. In term of scale of confidence in favor of impact, all the

above positive impacts were cited to be moderate and strong. This shows the level of scale factor and better prospects of technology in future.

Improved technology at Farmer field (60cm row spacing)

Table 4: Farmers observations about other impact of technology (in terms of scale 1 to 5)**

Indicators	Nature of impact*	In terms of scale
Soil texture/structure	+	3
Soil moisture	+	4
Other vegetations	NR	NR
Befits Complimentary	+	NR
Enterprises/resource use	NR	-
Product quality/nutritive value	-	3
(Other specify)	-	-

*impact as +(positive) – (negative) NR (Nil Response)
**1:Not at all, 2:Low, 3:Moderate, 4:Strong, 5:Very strong

Traditional practice at the farmer field (30 cm row spacing)

Table 5 indicates that the adopters were in the positive opinion that within the period of five years almost all the farmers will adopt the technology. The technology being better not only in term of yield improvement but also of better quality.

Table 5: Farmers opinion about future potential of the new technology

S. No.	Parameters	Percent
1.	Yield improvement	15-20
2.	Quality improvement	10
3.	Extent of adoption (area ha)	107318
4.	Probability of success of the technology	100
5.	Maximum adoption of the technology (Years)	5

Table 6: Constraints of technology adoption (in terms of scale 1 to 5)

Indicators	In terms of scale
A. Farm resources	
Availability of human labor	4
Irrigation water supply	5
Availability of cash/credit	4
Other specify	-
B. Technology	
Lack of proper information	1
Supply of new input/equipment	1
Soil moisture	1
Crop residue management	1
Risk of revenue loss/low yield	1
Other specify	-

Table 6 indicates three main problems related to farm resources identified by the adopters in the area namely in adequate labor availability, insufficient irrigation water and lack of credit/cash facility.

On the other hand due to good field work and efficient networking of scientists, no technology constraints was opined by the farmers. All the sample farmers were of the opinion that they were well informed about the technology with adequate input supply. With efficient soil moisture conservation and crop residual management, risk of revenue loss/low yield was nil.

On the basis of farmers response it can be observed that a very efficient technology was available which may yield good result in short span of time.

Conclusions and suggestions

The western Rajasthan is the worst hit area because of very low and erratic rain in most years. The coefficient of variation of rainfall is 40 percent. Thus the crop production is very risky and unsustainable. The technique of sowing pearl millet in wider row spacing not only provides sustainable grain production along with fodder production also, this technology is low input and affordable by the farmers of the area. Thereby risk may be reduced by adoption

of this technology. Thus crop in these fragile areas is assured and certain. This technology may also be used in other crops to get assured production. It is suggested that research efforts should be intensified to come out with more such technologies for the dry farming rain fed areas.

Despite technological and economic advancements, the condition of farmers continues to be unstable due to natural calamities and price fluctuations. National Agriculture Insurance Scheme covering all farmers and all crops throughout the country with built in provisions for insulating farmers from financial distress caused by natural disasters and making agriculture financially viable will be made more farmer specific and effective .

The central government will continue to discharge its responsibility to ensure remunerative prices for agricultural produce through announcement of minimum support prices policy for major agricultural commodities the food nutrition and other domestic exports requirements of the country will be kept in view while determining the support prices of different commodities. The price structure and trade mechanics will be continuously reviewed to ensure the favorable economic environment for the agricultural sector and to bring about an equitable balance between the rural and urban incomes.

The government will enlarge the coverage of future markets to minimize the wide fluctuations in commodities prices as also for hedging their risks. The endeavor will be to cover all important agricultural products under future trading in course of time. Reclamation of degraded and fallow lands as well as problem soils will be given high priority to optimize their productive use.

Integrated and holistic development of rain fed area will be promoted by conservation of rain water by vegetative method on water shed basis and augmentations of biomass production through agro and farm, forestry with the involvement of the water shed community. Management of grazing land will receive greater attention for augmenting availability of animal feed and fodder. Long term prospective plan for sustainable rain fed agriculture through water shed approach will be vigorously pursued for development of two-thirds on India's cropped area which is dependent on rains.

Rational utilization and conservation of the country's abundantly water resources will be promoted. Conjunctive use of surface and groundwater will receive highest priority. Special attention will be focused on water quantity and the problem of receding ground water level shed in certain areas as a result of over exploitation of underground aquifers proper on-farm management of water resources for optimum use of irrigation potential will be promoted. Use of insitu moisture management techniques such as mulching and use of macro overhead pressured irrigation systems like drip and sprinkler and green house technology will be encouraged for grater water use efficiency and improving productivity, particularly of horticultural crops. Emphasis will be placed on promotion of water harvesting structures and suitable water conveyance system in the hilly and high rainfall area for rectification of regional imbalances. Participatory community relation management will be encouraged.

The history and traditional knowledge of agriculture related to organic farming, soil moisture conservations techniques, preservation and processing of foods for nutritional and medicinal purposes is one of oldest in the world. Concerted efforts will be made to pool distill and evaluate traditional practices, knowledge and wisdom to harness then for sustainable agricultural growth.

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