

Improving the livelihood status of the farmers through frontline demonstration of rajma cultivation in Valley area of Dehradun

The agricultural innovation as defined by FAO is: “Agricultural innovation is the process whereby individuals or organizations bring new or existing products, processes or ways of organization into use for the first time in a specific context in order to increase effectiveness, competitiveness, resilience to shocks or environmental sustainability and thereby contribute to food security and nutrition, economic development or sustainable natural resource management”. Novelty is a key aspect of the definition, i.e. although the products, processes and ways of organization may already exist, they are new to the individuals or organizations who are bringing them into use in a given location and context for the first time. So as was in case of Rajma growing farmers who adopted it as a cash crop and the whole village has become as the Rajma village now. Rajma is a most important crop of hilly region of Uttarakhand during kharif season. In Yamuna valley near vikasnagar and sahaspur CDB area the climatic conditions is favorable with the its fertile sandy loam soil, mild temperature, irrigation facility and cropping system provide the ample scope to raising the rajma in spring season as sole and /as well as in intercropping with sugarcane. Rajma crop fit well in existing rainfed agro-ecological situation of the area. However, production (1,087 tonnes) and productivity of 7.8 q/ha of rajma in hilly region with spread of an area of 1,394 ha. Farmers in the valley area rarely grow the rajma as sole, and also in some extent in sugarcane as intercrop with local practices was trend in the selected village. Seed colour and its very acceptable taste of Rajma is a criterion for selection of seeds. Traditionally, locally available radish brown colored seed (100-150 kg/ha) was used for the sowing. It matures nearly 90-115 days after sowing having yield potential of 12-20 q/ha. Looking into the sustainability model of traditional crop as food and nutritive value, efforts were focused to modify the existing cultivation practices with improved agro techniques ie. Seed treatment with fungicide, seed rate, method of sowing, irrigation and fertilizer application, weed control and plant protection measures etc.

Nutritional value of Rajma: Owing to its high nutritive values, delicious taste and tradition it used as pulse. The rajma also known as “King of Nutrition”. The nutrition facts for 100 grams of boiled Rajma are: calories: 127, water: 67%, protein: 8.7 g, Carbohydrates: 22.8 g, Sugar: 0.3 g, fiber: 6.4 g and, FAT: 0.5 g. Although the nutritional quality of bean protein is generally lower than that of animal protein, beans are an affordable alternative for many people. In fact, beans are one the richest plant-based sources of protein, sometimes referred to as “poor man’s meat”. Rajma are mainly composed of starchy carbohydrates, which account for approximately 72% of the total calorie content also rich in healthy fibers, which moderate blood sugar levels and promote colon

health. Rajma is a good source of several vitamins and minerals, such as molybdenum, foliate, iron, copper, manganese, potassium, and vitamin K¹.

The Path to Success:

The farmers of Bheemawala, Vikasnagar CDBlock in District Dehradun, were engaged in their own traditional cropping system viz. Rice-wheat, sugarcane-ratoon-wheat and Maize—toria-wheat. Some progressive farmer took a step ahead and started raising rajma in a small area, to earn more return in a short period of time. Looking its quick cash return, few other farmers adopted this practice, and the area of sowing rajma kept on growing year by year. In the meanwhile Krishi Vigyan Kendra Dhakrani helped them to adopt the recommended cultivation package of practices in rajma crop. As the combined efforts of KVK and farmers, today's scenario, almost the whole area is converted in to rajma cultivation the trend of increasing rajma in this belt has been experientially viewed from 3 ha to 100 ha cross the boundaries to neighboring state of Himachal Pradesh. The families of these belts are getting lucrative returns from production of this new crop as compare to their traditional cropping pattern. According to the farmers rajma cultivation has become a boon to the farming community as it is not only providing them remunerative prices, but also enhancing the quality of their soil.

Details of frontline demonstration vs farmers practice in rajma cultivation

S No	Component	Farmers practice	Frontline Demonstration
1	Seed source	Chakrata Local	Chakrata Local
2	Seed rate Kg/ha	120	100
3	Seed treatment	-	<i>Trichoderma harzianum</i> and <i>Pseudomonas fluorescens</i> 5 g each per kg of seed., imidacloprid 3 ml/kg of seed PSB 500 ml/ha,
4	Sowing	Manually by spade uneven	Manually by spade in row at 45 cm apart seed to seed 10 cm in row
5	FYM t/ha	10	10 enriched with
6	Fertilizer kg/ha	DAP 150 kg as basal & 200 kg urea as top dressing at growth stage	100 kg Urea, 300 kg SSP and 50 kg MOP as basal and 100 kg urea as top dressing at branching stage, 1 foliar spray of 2% urea at flower initiation stage
7	Weed control	Manual weeding with spade 2 nos	Pendimethalin @ 1 kg/ha as Pre emergence followed by 01 manual weeding at 30 DAS
8	Plant protection	Neem oil 2 spray + 1 spray profephos/ coragen to control pod borer	Neem oil 2 spray + 1 spray of BT at pod formation stage to prevent the pod borer attack

Technology Intervention

Chakrata rajma (local) with radish brown color, plant height of 60-80 cm and it matures in 110-120 days, excellent cooking quality, more pods and higher grains/pod was used in the demonstration due to its higher acceptability in the local market. It is also tolerant to pod shattering with easy threshability. Based on the demand of farmers of village Bheemawala KVK planned to organize the frontline demonstration on rajma in spring seasons of 2015 and 2016. Five farmers were identified for conducting FLDs, prior to conduct FLDs the farmers were trained on production technology of rajma. The quantity of 80 kg/ha seed was used for sowing to maintaining the spacing of 45 cm x 10cm. Before the sowing, the seed were treated with phosphorus solublizing bacteria (PSB) 5ml/kg of seed following *Trichoderma harzianum* and *Pseudomonas fluorescens* 5 g each per kg of seed. A basal dose of 100 kg of N, 60 kg of P and 30 kg of S were applied as basal on the basis of soil test. Urea and single super phosphate was used source of N, P & S respectively.

Table 1. Impact analysis of rajma (mean of two years- 2015-2016) in selected village.

S.No .	Crops	Production qt/ha.	Cost of cultivation (Rs/ha)	Gross Return (Rs/ha)	Net Return (Rs/ha)	B.C.ratio
1	Wheat	44.4	32000	71200	36600	2.22
2	Toria	8.0	1400	24000	10000	1.71
3	Sugarcane	612	75000	177480	102480	2.37
4	Rajma, farmers practice	9.4	40000	94000	54000	2.35
5	Rajma FLDs	16.2	46000	162500	116500	3.53

Table 2: Case study of rajma (mean of two years 2015 and 2016)

S. No	Farmers	Total area (ha)	Cropped area (ha)	Total production (q/ha)	Total return (Rs.)	Cost of cultivation (Rs)	Net return (Rs.)	B.C.ratio
1	Mr. Madan Singh Saini	6.5	3.5	48.0	5.762	2.58	3.18	2.23
2	Mr. Shamsher Singh	8.0	4.2	51.0	6.120	2.45	3.67	1.66
3	Mr. Surender Singh Saini	5.2	2.1	26.2	3.142	1.30	1.85	1.74
4	Mr. Tejpal Singh	6.0	3.2	38.4	4.600	1.73	2.87	1.72
5	Mr. Gyan Singh	4.0	2.42	28.3	3.396	1.35	2.05	1.65

Table 3. Adoption of technology in the area.

S.No	Farmers name	Village/Block	Adoption level of the farmers		
			Total area (ha)	Area under improved agro technology (ha)	Replacement (%)
1	Mr. Madan singh Saini	Bheemawala	6.5	3.5	53.85
2	Mr.Shamsher singh	Bheemawala	8.0	4.2	52.5
3	Mr.Surender singh Saini	Bheemawala	5.2	2.1	40.38
4	Mr. Tejpal Singh	Bheemawala	6.0	3.2	53.33
5	Mr. Gyan Singh	Bheemawala	4.0	2.42	60.5

It is clear from the table 1, after KVK intervention yield of rajma was observed highest (16.2 q/ha), which was 72.3 % more than their traditional method of crop production. Similarly, net return was also markedly increased, ie higher Rs. 1,12,500/ha in FLD plots compared with their traditional method only Rs. 54000/ha. Though, cost of cultivation of FLD plot was slightly higher by Rs. 6,000/ha than farmers practice. The cultivation practices under FLDs favored towards adoption of technology.

Farmer's feedback

1. Crop was excellent in production potential in comparison to local practice of the area.
2. The crop was raised with nominal incidence of wilting which was under control than farmers practice.
3. Profitability of rajma cultivation under FLDs was higher than other crops in the system.
4. Rajma found remunerative than wheat, toria and sugarcane too.
5. Produce is sold immediately the day it is harvested due to quality grains with attractive shine.

Impact of Technology:

Rajma is typically a kharif season crop in hilly area. In the recent years due to global warming effects new or non -traditional areas are becoming a target area for seed production of rajma. In targeted areas, rajma is sown in the month of February and matures on/or before set of monsoon. In foot hills of Himalayan region slightly warm /favorable season made new habitat for commercial production of rajma. The farmers of said village and other nearby area farmers have been enthusiastic to grow the rajma by improved technology, i.e. use of HYV seed, bio-fertilizer

PSB, bio-fungicides like *Trichoderma* enriched FYM and other cultural practices. It is estimated that more than 100ha area is replaced by improved agro technologies.

