Problems and Prospects of Horticulture in Arang Block Raipur

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Abstract- Horticulture in Arang block Raipur prospects in consumption that measure the quantity of plant nutrients used per unit of arable land. In Raipur state, area under net sown has 4800.66 thousand hectares. Major crops are paddy, wheat, jowar, pulses and oil seeds. Paddy is grown in 3756.80 thousand hectare which occupies about 78.25 percent of the net sown area of the state, whereas wheat grown in 177.78 thousand hectare and gram in 356.52 thousand hectares in the state. The average size of holding was 2.77 ha in Arang block. The sample farmers comprised pre-dominantly of other backward caste. Farmers were growing paddy crop in kharif season, gram and wheat in rabi season and paddy in summer season. Tiwara were sowing as an utera and some farmers grown tur in bunds. Paddy crop covered highest cropped area 61.39 percent under kharif season in Arang block. The cropping intensity was found in 162.88 percent.

Index Terms-Fertilizer, major crops, farmers, Arang block, Raipur district, Supply chain, Nutrient management, Fertilizer recommendation.

I. INTRODUCTION

The Raipur which has often been dubbed “Rice Bowl” of Central India, with the main crop being Paddy. Apart from paddy, cereals like maize, kodo-kutki and other small millets, pulses like tur and kulthi and oilseeds like Groundnut, Soybean, Niger and Sunflower are also grown. Yet productivity is not very high. This brought a new thrust on the sector of Horticulture, as the region is also suitable for growing Mango, Crops, Guava and other fruits and a variety of vegetables. Horticulture is growing popularity owing to the high value of horticulture produces than agriculture crops. However, there needs to be a greater impetus in boosting the irrigation resources of the state and in promoting horticulture in intensive mode in the state. According to the old and existing data, a brief analysis is made on the status of Horticulture in the state which is furnished below. However, fresh efforts are being made to generate and compile statistical data through systematic data collection on Horticulture crops in the state.

Raipur district in centrally located in the state and constitutes the major part of Raipur plane. It is surrounded by Bilaspur in the North and by Bastar and some part of Orissa state in the south. Raigarh and some part of Orissa, standing in part which Durg district in situated in the west. It occupies the

South eastern part of upper Mahanadi valley and the bordering hilly in south and east. Thus, the whole district is divided into two major physical divisions, viz. the Raipur plain and the hilly area. Agro climatic conditions of Raipur are tropical to semi tropical and arid to semi arid. The average Rainfall of the district is 1352 mm and Maximum temp. in the district goes up to 45^0 C.

Farming in hilly area mostly depends upon rain. In Plane area Tube well, wells, Tanks, Canals and lift irrigation from River & Nala are the major source of irrigation. The Main Rivers of Raipur are Mahanadi, Kharun, Paire and Jonk. There is a great scope for the promotion of horticulture crops in the district due to availability of cultivable waste land (1, 01,000 ha.) in majority.

District Profile

- Geographical area 13,44,600 ha.
- Net sown area 5,47,800 ha.
- Total horticulture area during 2008-09-0.39 lakh ha.
- Proposed horticulture area- 0.42 lakh ha.
- Percentage increase from 2008-09 to 2014-15-10%.
- Forest cover 5,26,200 ha
- 57% marginal farmers own 11% land.
- 22% small farmers own 24% land.79% Small/Marginal Farmers own 33% land
- 24% others own 67% land.
- Average land holding 1.4 ha.
- Under fruits, Mango is a major crop which occupies 2240 ha. of the total cropped area of fruits (12 437.70 ha.). Under Spices Chilli is major crop which occupies 1340 ha. of the total cropped area of spices (3222 ha.). Under vegetables Brinjal is major crop which occupies 3554 ha. of the total cropped area of; vegetable (22684 ha.).
- Net irrigated area 367381 ha. (27%).
- Cropping intensity 136%.

Agro-climatic Zones- Agro-climatically, Raipur district comes under “Raipur plain” which is dominant over other agro-climatic conditions. Very small portion of the district comes under hilly section which is spread in some blocks of the district like Kasdol, Gariyaband, Mainpur & Devbhog. Present Irrigation Scenario- In the district the net irrigation area is 3.69 lakh ha. which constitutes 67.45% of net sown area. Most important sources of irrigation being surface water where irrigation by Canals and Tank which constitutes 85.3% of the net irrigation area. About 56% area under kharif crop and 31% of area under Rabi crop comes under assured irrigation. In the district approximately 7% cultivated area is under

horticulture crops (38891 ha.), out of which 66.6% area is under vegetable and spices cultivation (about 25906 ha.).

In Raipur district Fruits, Vegetables and spices produced are mostly consumed locally. But due to lack of marketing information and access to the organized markets farmers are often compelled to sell the surplus produces to the middlemen at the local market. Thus they are not getting the optimum return of the produces. As the fruits and vegetables are perishable in nature and due to lack of storage facilities often they sell the surplus products at a lower cost. In some major horticulture crops like Papaya, Water melon, Brinjal, Cauliflower, Cabbage, Tomato, Okra, Bottle guard, Bitter guard & Chilli, 20-30 percent of the produce is exported to near-by districts and other state also.

II. MATERIAL AND METHODS

A stratified random sampling has been used for selection of the samples. Arang block have been divided into five strata as their farmer size as marginal, small, semi-medium, medium and large farmer under proportional allocation. Sample sizes were at 95% confidence coefficient with marginal error of 10%.

Study Area : - The study was carried out at Arang block of Raipur district. It is situated in mid-eastern part of Raipur state and comes under the plains agro climatic zone. Raipur district is situated between 22° 33' N to 21°14'N Latitude and 82° 60' to 81° 38'E Longitude and 311 meter above sea level. The general climatic condition of study area is sub-humid to semi-arid as it located near the tropics of cancer.

Sample collection and analysis :- Total 500 soil samples from surface layer (0- 15cm) were collected from 20 villages of Arang block, the study area. Samples were collected in Grid basis i.e., one per 2.5 ha irrigated and 10 ha of rainfed area. GPS coordinate of all sampling sites recorded using a hand-held GPS device.

Nutrient index values and fertility rating :- *Nutrient index value (NIV) was calculated from the number or*

$$NIV = \frac{1 \times PL + 2 \times PM + 3 \times PH}{100}$$

proportion of samples under low, medium and high available nutrient status (Ramamoorthy and Bajaj 1969). i.e.,

Where, NIV = nutrient index value;

PL, PM, and PH are the percentage of soil samples falling in the category of low, medium and high nutrient status and given weightage of one, two and three respectively. The index values are rated into various fertility categories viz., low (<1.67), medium (1.67-2.33) and high (>2.33) for available N, P and K.

For available S and micronutrients, the ratings are very low (<1.33), low (1.33-1.66), marginal (1.66-2.00), adequate (2.00-2.33), high (2.33-2.66) and very high (>2.66).

Land Use :- Total geographic area of Raipur is 13.79 million hectares, out of which the forests occupy 4.47 million ha (35%). Forest area in Bastar-Plateau is highest (57%), followed by Northern Hills (45%) and Raipur Plains (25%). Barren land is also high (3.5 lakh ha) and it is highest in Raipur Plains (1.4 lakh ha) followed by Northern Hills (1.24 lakh ha) and Bastar-Plateau (0.85 lakh ha)

Soils :- The soils of Raipur vary considerably in the three agro-climatic zones. Though the nomenclature is different, the types of the soils especially the physical properties are the same. The different soils that exist in the three agro-climatic zones.

Climate :- Raipur comes under tropical climatic conditions. Raipur being near to the Tropic of Cancer possesses intense heating during the summer period, the sun remains overheads most of time during summer. The overall average temperature is 25.40C and Raipur Plains witnesses the hottest atmosphere with average temperature touching 27.20C due to the lower altitude and less forest cover, while, Northern Hills Zone usually observe the mild temperature averaging 23.80C due to its extreme north position and higher altitude. The day time temperature of the zone is 32.20C and it is highest recorded in the month of May (40.20C), whereas, it is lowest in the month of January (20.00C). Thus, the nights of Northern Hills are relatively cooler, while that of Raipur Plains are warmer. The general climate of Raipur state is dry sub-humid type where the annual potential evapo-transpiration is slightly higher than the annual rainfall.

General Agriculture Scenario :- About 45.7 per cent of the population belongs to scheduled castes and scheduled tribes. Agriculture is the main occupation of more than 80 per cent of the population. It is observed that majority of the farmers are still practicing the traditional methods of cultivation resulting in low growth rates and productivity. The farmers have to be made aware for adoption of modern technologies suitable to their holdings. Providing adequate knowledge to the farmers is essential for better implementation of the agricultural development plans and to improve the productivity. In Raipur region about 22% of net cropped area was under irrigation. The irrigation is characterized by a high order of variability ranging from 1.6% in Bastar to 75.0% in Dhamtari.

Crops and Cropping Pattern :- In Raipur, rice is the main crop-grown covering about 77 percent of the net sown area. Only about 20 percent area is under irrigation and rest under rainfed conditions. Of the three agro-climatic zones, about 73 percent area in Raipur plains, 97 percent in Bastar plateau and 95 percent area in Northern hills are rainfed. The irrigated area available for double cropping is only 87,000 ha in plains while it is only 2300 ha in Bastar plateau and Northern hills. The cropping intensity is 121 for the state, out of this a major area in rabi season is under utera (relay cropping) and mostly lathyrus is grown under utera, thus assured irrigated double cropped area is very less.

Change in cropping pattern :- Raipur has experienced a considerable degree of crop diversification in term of changes in the area under various crops since the formation of the state which was earlier largely in favour of food grains to meet the objective of self-sufficiency and state food security and now more towards horticulture i.e., nutritional security (Table 4). There is a rapid increase (404.2%) in area under horticulture crops during the last decade which is 791.2% in flowers, 759.82% in fruits and 297.7% in vegetable crops.

Production scenario of horticultural crops in Raipur :- Raipur is owed to a diversified climate in three agro-climatic regions. This makes it suitable for growing a wide range of tropical, subtropical, temperate horticultural crops which includes gamut of crops of fruits, vegetables, tuber crops, spices, flowers, and plantation crops, medicinal and aromatic plants. Current status of production of horticultural crops is 61.55 lakh tones from area of 5.97 lakh ha.

Fruit Crops :- The major fruit crops grown in Raipur state are Mango, Guava, Lime, Litchi, Cashew-nut, Sapota etc., apart from these major fruit crops minor fruits like Sitafal, Bael, Ber, Anola etc., are also grown both as cultivated and wild crop. The total area of the fruit crops in the state is 166813.55 ha along with the production. Agro climatically Mango can be grown in the whole part of the state successfully while the northern hilly area of Sarguja and Jashpur district is suitable for production of Litchi. Cashew nut can be grown well in the plateau region of the Bastar & Raigarh district.

Vegetables :- Mostly all vegetable crops like Solanaceous crops, Cucurbits, Beans, Cabbage, Cauliflower etc., are grown very well in the state. The total area of vegetable crops in the state was recorded 334916.92 ha.

Spices :- Chilli, Ginger, Garlic, Turmeric, Coriander & Methi are the major spices grown in the state. The total area of spices recorded in year 2010-11 was 77126.34 ha with the production of 486592.88 MT.

Flowers :- Area under flower cultivation is negligible in the state. With the formation of new state the demand of flowers is increasing day-by-day, to meet out the growing demand of flowers it is essential to promote commercial floriculture among the farmers. The major flowers like Marry-gold, Tuberose, Gladiolus, Roses, Gaillardia, Chrysanthemum, Orchids etc., can be grown very well without much care. The present area under floriculture in the state is 7130 ha with the production of 26603.96 MT in the year 2010-11.

Medicinal & Aromatic Plants :- The medicinal crops grown in the state are Ashwagandha, Serpagandha, Satawar, Butch, Aonla, Tikhur etc. Some aromatic crops like Lemongrass, Pamarosa,

Jamarosa, Patchauli, Eucalyptus citridora are promoted by the department for commercial cultivation among farmers. RESULTS AND FINDINGS

Profile characteristics of the sample farmers :- It can be seen from the Table 1 that, average size of holding was 2.77 ha. It varied from 0.51 ha (marginal farmers) to 6.00 ha (large farmer) The sample farmers comprised pre- dominantly of other backward caste 59.52 percent followed by scheduled tribe 14.28 percent, scheduled caste 14.28 percent and others 11.90 percent. 66.66 percent farmers having below one ha, 21.42 percent between 1- 2 ha. Medium farmers (4-10 ha) found only 2.38 percent in Arang block.

Table 1: General characteristic of sample farmers in Arang block

S.N.	Particular	Sample Farmers				
		Marginal	**Small**	**Semi-medium**	**Medium**	**Total**
1.	Total no. of farmers	28 (66.66)	9 (21.42)	4 (9.52)	1 (2.38)	42 (100)
2.	Average Size of house holding	0.51ha.	1.67ha.	2.91ha.	6.00ha.	2.77ha.
3.	Education of farmers					
	a. Illiterate	15 (53.57)	4 (44.44)	2 (50)	- -	21 (50)
	b. Primary	5 (17.85)	2 (22.22)	1 (25.00)	- -	8 (19.04)
	c. Middle	3 (10.71)	1 (11.11)	1 (25.00)	- -	5 (11.90)
	d. Higher	4 (14.28)	1 (11.11)	- -	1 (100)	6 (14.28)
	e. Graduate	1 (3.57)	1 (11.11)	- -	- -	2 (4.76)
	Total	28 (100)	9 (100)	4 (100)	1 (100)	42 (100)
4.	Caste wise house hold a. OBC	18 (64.28)	4 (44.44)	2 (50.00)	1 (100)	25 (59.52)
	b. ST	3 (10.71)	2 (22.22)	1 (25.00)	- -	6 (14.28)
	c. SC	4 (14.28)	1 (11.11)	1 (25.00)	- -	6 (14.28)
	d. others	3 (10.71)	2 (22.22)	- -	- -	5 (11.90)
	Total	28 (100)	9 (100)	4 (100)	1 (100)	42 (100)

Note: Figures in parentheses indicate percentage to total.

Cropping pattern

Farmers in Arang block taking crops mainly paddy in kharif, gram and wheat in rabi and few farmers were paddy in summer season. Tiwara were sowing as an utera and some farmers grown tur in bunds. Paddy crop covered highest cropped area 61.39 percent in kharif season, yet it decreased and come down on 2.34 percent in summer season. The cropping intensity was found in 162.88 percent. (Table 2)

Table 2: Cropping pattern of the sample farmers in Arang block

S.N.	Crop Season	Marginal	Small	Semi-Medium	Medium	Total
1.	Kharif : Paddy	19.59 (53.45) (37.49)	15.04 (62.56) (28.78)	11.62 (67.47) (22.23)	6 (83.33) (11.48)	52.25 (61.39) (100)
2.	Rabi: Gram Wheat	10.14 (27.66) (54.39) 6.92 (18.88) (56.62)	5.30 (22.04) (28.91) 3.70 (15.39) (30.27)	2.80 (16.26) (15.02) 0.80 (4.64) (6.54)	0.40 (5.55) (2.14) 0.80 (11.11) (6.54)	18.64 (21.90) (100) 12.22 (14.35) (100)
3.	Summer: Paddy	0 (0) (0)	0 (0) (0)	2 (11.61) (100)	0 (0) (0)	2 (2.34) (100)
4.	Total operated area	19.59	15.04	11.62	6	52.25
5.	Total cropped area(A+B+C)	36.65 (100)	24.04 (100)	17.22 (100)	7.20 (100)	85.11 (100)
6.	Cropping intensity (%)	187.08	159.84	148.19	120.00	162.88

Crop wise Expenditure on Fertilizer use :- It is evident from Table 3 that farmers of Arang block used more fertilize 18.83% of fertilizer expenditure to the cost of cultivation on paddy crop followed by wheat 15.91% and gram 12.74% . In paddy crop, maximum fertilizer expenditure was incurred (Rs. 6097.87 per ha.) of medium farmer which accounted for about 16.26% of the total cost of cultivation followed by Rs. 5785.86 per ha. of marginal. Minimum expenditure was recorded for medium farmers of Rs. 5225.36 per ha. In case of gram maximum expenditure observed in small farmers 3247.01 Rs. / ha

accounted 14.52% to total to the total cost of cultivation. Minimum was observed in marginal farmers 2467.20 accounted 11.14% to the total cost of cultivation.

Small farmer used only nitrogen and phosphorus for cultivation of gram. In wheat maximum expenditure was observed 17.54% (5294.85 Rs. /ha) to the cost of cultivation of marginal farmer and minimum recorded 14.78% (4675.20 Rs. ha) to total cost of cultivation.

Table 3: Fertilizer expenditure on sample farmers under different crops in Arang block

Farmer	Crop	Fertilizer expenditure (Rs./ ha)				Average cost of cultivation (Rs./ ha)	% of fertilizer expenditure to total cost of cultivation
		N	P2O5		K2O		
		Total					
Marginal	Paddy	1435.56	3162.56	1187.74	5785.86	38811.40	14.91
	Gram	306.28	2160.93	-	2467.20	22141.40	11.14
	Wheat	1386.01	2958.98	949.86	5294.85	30179.44	17.54
Small	Paddy	1398.67	2893.08	1118.14	5409.88	4155.72	14.41
	Gram	318.35	2258.40	670.26	3247.01	22356.67	14.52
	Wheat	1079.17	2382.33	1213.70	4675.20	31640.00	14.78
Semi-medium	Paddy	1453.95	2678.88	1092.52	5225.36	39073.33	13.37
	Gram	259.00	2456.91	-	2715.91	24166.67	11.24
	Wheat	1392.13	2764.03	611.63	4767.78	30000.00	15.89
Medium	Paddy	1586.35	2764.02	1747.50	6097.87	37500.00	16.26
	Gram	582.75	2764.02	-	3346.77	23750.00	14.09
	Wheat	1036.00	2764.02	1048.50	4848.52	31250.00	15.52
Total	Paddy	5874.53	11498.54	5145.90	22518.97	119540.45	18.83
	Gram	1466.38	9640.26	670.26	11776.90	92414.74	12.74
	Wheat	4893.31	10869.36	3823.69	19586.36	123069.44	15.91

Potential horticultural crops for Raipur:

The crops, papaya and mango together contribute about 60% of the total fruit production; solanaceous and cole crops together contribute 51% total vegetable production. Among spices chilli, ginger, turmeric together contribute 76.7% of total spices production. The flowers are another emerging crops where marigold alone contribute 48% and tuberose, gladiolus, rose together contribute to 41% of total flower production. Among medicinal and aromatic crops, the aromatic plants hold the key and lemon grass alone contribute to 55.8% followed by Eucalyptus and Khush. Other crops are contributing less but having a very good scope as the prevailing agro-climatic conditions in the states are favourable. Some of the recommendations based on agro-climate and land pattern in Raipur are given here.

1. A part of barren lands in Raipur plains, The sprinkler or drip irrigation can also be introduced for high water use efficiency.
2. Only 22% of the net cropped area is under irrigation and the areas with less available water conditions for irrigation, the arid fruits particularly Ber, Aonla, Pomegranate, tamarind and Sapota has better scope, particularly in segments of Raipur plains .
3. There is good scope for expansion of litchi in Northern Hill zone and Papaya in Raipur plains.
4. Based on annual rainfall and altitude, there is scope for cultivation of tea in very few pockets in Northern Hill zone.
5. Low intensity of cropping has serious impact (121%). Doubling cropped area through intercropping has potential because only 26% of area in Raipur plains, 12% area in Northern Area and only 2% area in region have double cropped area. Hence there is good scope for promoting cultivation of several vegetable crops, spices, medicinal and aromatic plants as intercrop with fruit crops or in combination with other crops.
6. Rose, tuberose, gladiolus, orchids in Northern Hill zone and marigold, chrysanthemum, jasmine in Raipur plains and.

III. HORTICULTURE IN RAIPUR ANALYSIS

Strengths

- ❖ Land availability for area expansion.
- ❖ Varied agro-climatic condition in 3 zones for growing wide range of Horticultural crops.
- ❖ Well connected to big cities for developing the market network.
- ❖ Well established NARS research network.

Weaknesses

- ❖ Lack of awareness on modern methods of cultivation.
- ❖ Lack of assured irrigation facilities.
- ❖ Weak linkage between farmers and R&D institutions.
- ❖ Focus is low on area expansion under wasteland and dry land Horticulture
- ❖ Inadequate crop diversification
- ❖ Power supply is erratic in many parts of the state
- ❖ Limited focus on farmer training programmes for horticulture.
- ❖ Lack of awareness on Hi-tech horticulture and quality consciousness among growers.
- ❖ The marketing channels are not well developed

Opportunities

- ❖ Promotion of protected cultivation and micro-irrigation.
- ❖ Large tracts of drylands / rainfed areas / wastelands can be utilized for promotion of horticulture (especially for Arid crops and cashew)
- ❖ Nutritional and livelihood security of tribals by area expansion under dry land Horticultur
- ❖ Promoting eco-friendly /integrated farming
- ❖ Great scope for improving ground water source & irrigation through rain water harvesting
- ❖ Capacity building among farmers and developmental agencies on modern methods of cultivation
- ❖ Scope for establishing growers' associations and self-help groups
- ❖ Production of quality seeds and planting material involving stakeholders.

IV. PROPOSED ACTIVITIES AND DISCUSSION

The following activities are required to be undertaken under the proposal, in order to accomplish the objectives envisaged and to overcome the problems in production, post-harvest management, quality improvement, marketing and processing of horticultural crops for the benefit of the farmers in the state.

- Model nurseries in each district.
- Units for fruit plants and plantation crops in each district.
- Units for hybrid vegetable seedlings production in portrays in each district.
- Vegetable seed production unit and network of nurseries and seed production units.
- Spices and medicinal & aromatic plants seed and planting material production unit
- Seed processing unit
- Quality control laboratory for seed and nursery plants
- Model orchards under participatory mode
- Bio-pesticide production unit
- Plant health clinic and pest / disease diagnosis center including Pest / disease forecasting unit and advisory services.
- Soil and leaf analysis lab and advisory services
- Horticulture Training Centre for HRD activities in horticulture (one at HQ).
- Market support and advisory services for self help groups and co-operatives.
- Strategy for water management for high water use efficiency.
- Field Demonstration of improved technologies in fruits (mango, crops, grapes, papaya, cashew, lemon etc.) and vegetables (potato, tomato, chillies, cabbage and cauliflower) on 1.0 ha plot of each (27 demonstration in each district).

- Field Demonstration of integrated pest and disease management in mango, lemon, papaya, tomato, cabbage, cauliflower and chillies on 1.0 ha plot of each (27 demonstration in each district).
- Demonstration of large scale production of vermi-compost and vermi-wash (27 demonstration in each district).
- Demonstration of protected cultivation – High-tech polyhouses and low cost polyhouses (27 demonstration in each district).

The relevance of these activities, manpower and infrastructure requirements for their execution and the executing arrangements are given below:

V. CONCLUSION

The present study has revealed that crops production and supply chain management is a very important aspect of Indian economic situation. Based upon the present study ion Raipur, some conclusion and suggestions are recommended. The total area and production of Crops in Raipur district is 2108 ha. and 49516 metric tons production respectively. High risk involves in the production of Crops growing because it's perishable nature. Crops was emerging fruit crop in Raipur and the economic aspects of Crops supply chain management are not adequately known to narrow down the gap. Major constraints pertaining to cultivation of Crops were problem of high temperature (76.67 %) is generally faced by all category farmers. High temperature and problem of electricity, lack of improved varieties for Crops cultivation was found as most important constraint faced by the Crops growers. Similarly, lack of processing industry, storage, fluctuation of price and regulated marketing system was reported as most important constraint faced by the farmers during supply chain management of Crops. During summer season due to high temperature the leaves of Crops is badly damaged due to sunstroke. Varieties which are capable to resist high temperature is to be evolved.

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