

Short Communication

Acuity analysis of the vegetable experts to determine the priorities in sustainable vegetable production technologies

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Vegetables are short duration and profit-making crop for the farmers especially small and marginal one. By adopting vegetable-based cropping system, farmers can earn more profit from smaller piece of land by enhancing the cropping intensity. Efficient production technologies are very important to utilise scarce natural resources and minimize the cost of production. Several researches on the production aspects are being carried out by research organizations, agricultural universities and other agencies. But research studies are not systematic. Many duplicities found in researches. To overcome this problem prioritizing in the research issues (Roy et al. 2015) in vegetable production sector is very important as Roy et al. (2016) identified priority areas in agribusiness and marketing in vegetable sector and conservation of vegetable germplasm (Roy et al. 2016).

This study was conducted through online survey. The survey questionnaire had been sent purposively to 50 scientists of ICAR institutes, 50 teachers of different State Agricultural Universities (SAUs) and 50 subject matter specialists of Krishi Vigyan Kendras (KVKs) who deal with vegetable crops, for their response. Among them 75 respondents replied from 22 different states representing different agro-climatic regions of India (Table 1). The questionnaire contained multiple choice type questions related to problems in production aspects of vegetable sector and the respondents were asked to score each problem in a five-point continuum ranging most important (5), important (4), undecided (3), less important (2) and not so important (1) as they perceived. The total score for each problem was obtained by summing the scores given by 75 respondents and rank of the problems was calculated. Linear Regression

analysis was done among the problems considering ranked 1 problem as dependent variable while others as independent to know in what proportion (R^2 value) (Table 3) the independent variables represent the dependent variable. The $\hat{\alpha}$ -value represents 1 unit change in the corresponding independent variables will change the dependent variable equal to the corresponding $\hat{\alpha}$ -value.

The results have been depicted in Table no 2. The most important problem identified is extensive and indiscriminate use of pesticides in vegetable cultivation which may lead to severe health hazards in long run (score 340; rank 1). The deleterious effects of chemical pesticides on human health and eco system have forced agriculturist even the proponents of modern agricultural technology to look for integration of cultural practices, plant product-based formulation and bio agents for lessening the quantum of deadly pesticides. Of late, there is an increased acceptance of integrated pest management strategy and practices (Wason et al, 2009), (Roy et al., 2017). The second important problem is regarding protected cultivation. Though protected vegetable cultivation is very beneficial but due to high cost involvement, farmers could not adopt it in desired scale (score 336, rank 2). According to Kaur et al, 2018, 34.48% vegetable growers in Punjab were willing to increase the area under protected vegetable cultivation while maximum number of vegetable growers (45.98%) wanted to keep the area constant under protected vegetable cultivation due to non-availability of land to increase the area and unable to handle protected structures on more area. The third problem is disease pest infestation and water stress at the initial stage of crop growth (score 322; rank 3) which require proper nursery management and weed infestation (score 316; rank 4) which has become severe problem in vegetable cultivation. Jaganathan et al. (2009) reported that the farmers of Thiruvananthapuram district of Tamil Nadu had favourable attitude (64%) and most favourable attitude

Table 1: Distribution of the respondents from different states of India

State	Number of respondents		
	ICAR institutes	SAU	KVK
Jammu and Kashmir	-	1	1
Himachal Pradesh	-	5	-
Punjab	-	1	-
Haryana	-	1	-
Rajasthan	-	2	1
New Delhi	1	-	-
Uttar Pradesh	15	-	1
West Bengal	2	4	1
Odisha	-	-	1
Chhattisgarh	-	-	1
Gujrat	1	7	2
Maharashtra	1	1	-
Andhra Pradesh	1	3	3
Karnataka	1	2	2
Kerala	-	1	1
Tamil Nadu	2	1	1
Goa	1	-	-
Assam	-	1	1
Arunachal Pradesh	-	-	1
Nagaland	-	-	1
Manipur	-	-	1
Andaman and Nicobar Island	1	-	-
Total	26	30	19

(14%) towards organic farming. But proper knowledge about the standards of organic cultivation of vegetables is not available (score 307; rank 5). Likewise, bio-fertilisers in vegetable cultivation is not popular (score 307; rank 5) as 74.37% cauliflower growers in western Uttar Pradesh told that, they do not have proper knowledge about bio-fertiliser application (Kumar et al., 2018). The next problem identified was quality of vegetables for processing and export is not well acceptable (score 305; rank 6). The next pertinent problem is uneconomic use of irrigation water in vegetable production (score 302; rank 7). Drip and sprinkler technologies of irrigation still not popular among the vegetable growers. Impact of the developed production technologies is not estimated (score 299; rank 8). Very few impacts assessment study has been conducted like Singh et al., 2015 reported that intervention of various high yielding varieties along with improved production and protection technologies in different vegetable crops not only increased the average productivity of the crops from 2.48 to 27.54 per cent but also enhanced the average annual income of the households of Sonbhadra district of eastern Uttar Pradesh. Next problem is recommendations on manure and fertilisers application is not well validated (score

Table 2: Percent distribution of the vegetable experts categorized priority parameters from most important to not so important

Parameter	5	4	3	2	1	Score	Rank	β	t	Sig.
Extensive and indiscriminate use of chemicals in vegetables leads to health hazard	52	17	2	2	2	340	1	-	1.327	.192
High costs involvement in protected vegetable cultivation is the constraint in adoption by the farmers	50	16	6	1	2	336	2	.331	2.339	.024
Disease – pest infestation, water stress at the initial stages of crop growth leads to crop losses	31	36	7	1	0	322	3	.208	1.563	.126
Weed infestation is becoming severe problem	36	25	10	2	2	316	4	-.411	-2.577	.014
Standard of organic cultivation of vegetables is not available	29	28	14	4	0	307	5	-.063	-.416	.679
Bio fertilizers in vegetable cultivation is not popular	27	33	11	3	1	307	5	.142	1.004	.321
Quality of vegetables for processing and export is not well acceptable	26	33	12	3	1	305	6	-.388	-2.758	.009
Uneconomic use of irrigation water in vegetable production	29	27	13	4	2	302	7	.660	4.044	.000
Impact of developed production technologies not known	26	31	11	5	2	299	8	.291	1.854	.071
Recommendations on manure and fertilizer application is not well validated	23	34	11	7	0	298	9	.200	1.151	.256
Unawareness about benefits and use of mulching	23	32	13	5	2	294	10	-.402	-2.647	.011
Appropriate technologies for growing vegetables in saline areas/ saline soils are lacking	28	26	5	8	8	283	11	-.012	-.078	.938
Recommendations for intercropping and mixed cropping are not well-tested	18	26	24	6	1	279	12	.189	1.274	.210
Technologies for homestead production of vegetables are inadequate	12	32	24	7	0	274	13	-.047	-.327	.745
Inadequate production technology for growing vegetables in hilly regions	20	22	17	11	5	266	14	.051	.390	.699
Appropriate recommendations for intercultural operations not available	9	32	26	6	2	265	15	-.158	-.857	.396
Technologies for production of vegetables in Bill, Haor and Charland, areas are inadequate	8	21	25	7	14	227	16	.207	1.604	.116

5. Most imp 4. Important 3. Undecided 2. Less imp 1. Not imp.

Table 3: Linear regression model

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.745 ^a	.555	.386	.760

a. Predictors: (Constant), c16, c12, c1, c5, c13, c3, c9, c10, c8, c14, c15, c11, c7, c6, c4, c2

298; rank 9). Adding to this, Kumar *et al.*, 2018 reported that, quality chemical at Govt. sale counter was not available for the cauliflower growers of western Uttar Pradesh. Unawareness about benefit and use of mulching (score 294; rank 10) and non-availability of technology for growing vegetables in saline areas or saline soil (score 283; rank 11) identified as problems is vegetable production sector. Recommendations for intercropping and mixed cropping are not well tested (score 279; rank 12). Nearly 67% vegetable growers of Indore district of Madhya Pradesh did not have knowledge about intercropping in vegetables (Patel and Chouhan, 2017). Other pertinent problems are inadequate production technologies in homestead areas, hilly region, bill, haor and char land.

Vegetable is a sunrise industry in India and production sector is very important to economise the sector and make the vegetable production and marketing sustainable. Pertinent issues have been ranked accordingly for future intervention in vegetable production sector in India. Researchers, policy makers, marketing personnel and other stakeholders may work accordingly to address the issues. Resources of intervention should be allocated according to the priority rank came under the study.

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