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Human Resource Development for Quality Potato Production and Post-harvest Management: An Evaluation

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ABSTRACT

ICAR-Central Potato Research Institute, Shimla regularly organizes 21 days Summer School training course on quality potato production for scientists/teachers/extension functionaries of ICAR institutes, SAUs and KVKs located in different states of India. The current study was undertaken to evaluate the impact of Summer school on the knowledge and skill enhancement of trainees and overall evaluation of the training programme. Data were collected on different aspects on conduct and impact of training using a questionnaire which was administered before and after the conduct of the training programme. Results of the study revealed that training had significant impact on enhancing the knowledge level of participants in all areas of potato technologies. Average enhancement in knowledge was estimated to be 25.7 per cent. Majority of the participants expressed that they learned new skills in different areas of potato R&D. Most of the respondents were very well satisfied with the behaviour and style of teaching, course contents and training delivery methods. More than half of the participants graded training course as very good.

Keywords: Evaluation, impact, knowledge gap, summer school,

INTRODUCTION

Potato is one of the basic vegetable of mass consumption in India and abroad and has become 4th important staple food crop after rice wheat and maize (Kalloo et al., 2005). India is the 2nd largest potato producer in the world only behind China. During the year 2013-14, India produced 41.5 million tonnes of potato from an area of 1.97 million ha with average productivity of 21.1 tonnes/ha (Indian Horticulture Database, 2014). With ever increasing population, the potato consumption in India is expected to increase manifolds in future. According to Vision 2050 of Central Potato Research Institute, Shimla, India will require 124.8 million tonnes of potato from an area of 3.62 million ha by the year 2050 (CPRI Vision 2050, 2014). Human resource development is the key component for the successful implementation of any developmental activity. Transfer of knowledge and new technologies plays a very critical role in overall growth and development of agriculture sector. Therefore, it is necessary to update the knowledge and skills of teachers, researchers as well as extension functionaries in the field of their specialization through organization of various capacity building programmes. The importance of training as an indispensable instrument for human resource development cannot be overemphasized. Training is the process by which an individual's efficiency and effectiveness in the given context of a job can be maximized. It helps in increasing knowledge, improving skills and changing attitude of participants so that they can realize their potential in specific area. Evaluation of training programme is an attempt to obtain information (feedback) on the effect and impact (actual, possible or potential) of training programme and to assess the value of training. Evaluation is an integral part of the overall training management process.

In order to achieve the projected production level of potato, farmers need to adopt improved varieties and technologies for potato cultivation. For the enhancement of knowledge and skills of researchers, growers and extension functionaries working in the potato sector, ICAR-CPRI, Shimla regularly organizes training programmes. These kinds of trainings require the investment of a lot of human as well as financial resources. Therefore, it needs to be evaluated from time to

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time in order to know the effectiveness of training in bringing desired changes in knowledge and skills of the trainees. Keeping this in view, current study was planned to evaluate the impact of 21 days Summer School conducted by ICAR-CPRI, Shimla for 20 scientists, teachers and Subject Matter Specialists (SMSs) from ICAR institutes, State Agricultural Universities and KVKs of 11 different states of the country during 2013-14.

METHODOLOGY

In this study, evaluation of Summer School was based on indicators like different activities and manner in which training was imparted. It was measured in terms of percentage gain in knowledge and skills, level of satisfaction of trainees and overall opinion of trainees regarding content and delivery mechanism. The gain in knowledge was measured by administering a knowledge test using a well structured questionnaire containing multiple choice questions on potato cultivation, utilization, marketing, storage and improvement. This questionnaire was administered to respondent before and after the conduct of training. Subject wise gain in knowledge was calculated based on difference in marks obtained before and after training. Paired t-test was applied to assess whether the gain in knowledge was significant or not. The percentage gain in knowledge acquired through training was also calculated by use of following formula:

$$K = \frac{(PoTs - PrTS)}{A} X\ 100$$

Where, K = Percentage gain in Knowledge
$PoTS$ = Mean Post-Training Score
$PrTS$ = Mean Pre-Training Score
A = Maximum achievable score

Level of satisfaction of trainees was measured using a scale having 3 point continuum ranging from 'highly satisfied' to 'satisfied' and 'dissatisfied'. Similarly, opinion from all the trainees was sought on overall grading of the programme in four categories namely 'excellent', 'very good', 'good' and 'average'. Data were analyzed using SPSS software. Descriptive statistics and paired t-test were used to arrive at results.

RESULTS AND DISCUSSION

Profile Characteristics of the participant trainees

This summer school was attended by 20 trainees from 11 states of the country. Analysis of their socio-personal characteristic revealed that majority (85%) of them belonged to medium age group i.e. 30-50 years. Most of the trainees (65%) were Scientists/Assistant professors in different ICAR institutes and State Agricultural Universities (SAUs). Most participants were from Horticulture stream and Ph.D. holders. This is because potato comes under horticulture sector in many states. It can be seen from Table 1 that the group was heterogeneous in terms of age, education and service experience. It was found that nearly half of the participants had prior experience of working in potato crop.

Table 1: Distribution of participants on the basis of their socio-personal characteristics

n=20

Characteristics	Categories	Frequency (f)	Percentage (%)
Age	Below 30 years	2	10
	30-50 years	17	85
	Above 50 years	1	5
Education	Post Graduate	3	15
	Ph.D.	17	85
Service Experience	Less than 10 years	14	70
	10-20 years	5	25
	More than 20 years	1	5
Stream/subjects	Horticulture	13	65
	Agriculture	5	25
	Others	2	10
Designation	Scientists/Asst. Professor	13	65
	Subject Matter Specialist	7	35
Experience in potato	Worked for potato crop	9	45
	Not worked for potato crop	11	55

The gain in knowledge and skills of the participants

Overall gain in knowledge

A questionnaire containing 70 multiple choice questions on various subject areas which pertaining to quality potato production and post-harvest management was developed and administered to the trainees before as well as after the conduct of training. The pre and post knowledge score was examined and results were presented in Table 2.

Table 2: Impact of Summer School on improving knowledge level

n=20

Particulars	Pre-training Score	Post-training Score
Maximum achievable score (A)	70	70
Mean knowledge score	31.7 (PrTS)	49.7 (PoTS)
Mean Knowledge gap	38.3	24.7
Per cent knowledge score	45.3	71.0
Knowledge gap (%)	54.7	29.0
Standard Deviation	7.04	4.33
Gain in knowledge score	PoTS-PrTS=18.0	

Percentage Gain in knowledge (K) = 25.7; 't' value= 10.26**
**Significant at 1 % level of probability

Analysis of data in Table 2 revealed that the pre knowledge score was 45.3 per cent which increased to 71.0 per cent after the completion of training programme. The knowledge gap of participants reduced from 54.7 per cent to 29.0 per cent. Thus, there was overall gain in knowledge of participants by 25.7 per cent. Paired't' test revealed that the change in knowledge was significant at 1 per cent level of probability. This shows that training was very successful in increasing the knowledge of respondents significantly. These findings are in line with Kumar and Biswas (2005) who reported gain in knowledge of participants after training.

The subject wise gain in knowledge

Training was provided on different aspects like basic knowledge, planting methods, fertilizer application, disease and pest management, processing, marketing, storage etc. The subject wise gain in knowledge was studied with the help of pre and post average score and results are given in Table 3.

Table 3: Distribution of respondents according to their pre and post-knowledge score in different aspects of potato production technologies

Different aspects of potato production technology	Pre-test knowledge score average (%)	Post-test knowledge score average (%)	Percentage gain in knowledge	Paired 't' value
Basic knowledge of potato	34.5	93.6	59.1	13.43**
Agro-techniques for potato cultivation	51.5	65.4	13.9	3.68**
Potato disease and pest management	51.8	67.3	15.5	3.42**
Seed potato production technology	40.0	55.0	15.0	3.8**
Processing and storage of potato	47.3	86.4	39.1	9.73**
Breeding and Biotechnology application in potato	32.8	55.7	22.9	4.29**
Economics and Marketing in potato	68.0	76.0	8.0	2.18*

The data in Table 3 depicted the distribution of respondents according to their knowledge level in different areas before and after the conduct of training along with percentage gain in knowledge. The maximum knowledge gain was observed in the area of 'basic knowledge of potato' (59.1%) followed by 'processing and storage of potato' (39.1%), and 'breeding and biotechnology applications in potato' (22.9%). The gain in knowledge in training areas like 'potato disease and pest management' and 'seed potato production technology' was almost equal. It implies that most of the trainees were not having proper knowledge in above mentioned aspects of potato cultivation. The results from paired t-test for pre and post knowledge score showed that there was significant increase in knowledge in almost all areas of training at 1 per cent level of probability. In case of 'Economics and marketing of potato' change in knowledge was significant at 5 per cent level of probability. This gain in knowledge especially in the field of potato breeding, biotechnology, disease and pest management and seed potato production technology will definitely help trainees to understand the nuances of potato production. With enhanced knowledge, they will be able to deliver it to potato growers of their respective regions. Gain in knowledge in 'economics and marketing in potato' was only 8.0 per cent which may be because trainees were already aware of the economics and marketing aspects in potato.

The gain in different skills related to potato Research and Development (R&D)

Several practical sessions were organized for trainees during Summer School, so that they can learn new skills related to potato R&D. These skills were related to application of biotechnological tools, detection of potato diseases and pests, processing etc. (Table 4).

Table 4: Gain in different Skills of potato production by the participants during practical training n=20

Techniques (Practical)	Learned new skill	Known skill improved	No new learning
Gene expression analysis using Microarray techniques	17 (85)	3 (15)	0 (0)
DNA fingerprinting & genetic fidelity testing of potato cultivars using simple sequence repeat (SSR) analysis	17 (85)	3 (15)	0 (0)
Soil & plant test for fertilizer recommendation	7 (35)	10 (50)	3 (15)
Screening techniques for potato late blight resistance	16 (80)	3 (15)	1 (5)
Isolation, identification and inoculation techniques for Ralstonia solanacearum and Streptomyces spp.	17 (85)	2 (10)	1(5)
ELISA for detection of potato pathogens	16 (80)	4 (20)	0 (0)
Electron Microscope techniques for virus detection	20 (100)	0 (0)	0 (0)
Virus detection through lateral flow immune assay (LFIA) strips, Polymerase chain reaction (PCR) and real-time PCR	18 (90)	2 (10)	0(0)
Preparation of processed potato products	10 (50)	8 (40)	2 (10)
Tissue culture nutrient stock solutions & media preparation for in-vitro cultures	13 (65)	7 (35)	0 (0)
Monitoring of aphids in potato seed production and their identification	9 (45)	10 (50)	1 (5)

It can be observed from the results that a majority of trainees learned a new skill during practical training. New learning was acquired by cent per cent of trainees in use of Electron Microscope for virus detection. Other techniques such as Virus detection through LFIA strips,

PCR and Real time PCR; Gene expression analysis using microarray, DNA finger printing and genetic fidelity test using SSR and detection techniques for pathogens was perceived new by 80-90 per cent of trainees. Half of the trainees felt that they improved known skills like monitoring of aphids in potato and soil and plant testing for fertilizer recommendation. Similar kinds of results were observed by Singh et al, 2013. Thus, it can be said that the trainees were given all the opportunities during practical sessions which were reflected in terms of learning new skills in most of the areas and improvement in already known skills in few areas.

Level of satisfaction

The level of satisfaction was measured in terms of arrangement for training, course contents, methods of training and competency of faculties. Data from Table 5 showed that most of the trainees were very well satisfied with the training contents, its arrangement and delivery mechanism. Majority of trainees were highly satisfied with 'behaviour and style of teaching of the faculty' (90%) and 'extent of laboratory facilities available for practical session' (80%). Nearly 65 per cent of respondents were of the view that training will partially help them to do their job more effectively. Most of the trainees (60-70%) were satisfied with general arrangement for training and opportunities given for participation in decision making and planning. None of them were dissatisfied.

This result implies that the trainees were mostly satisfied with the style of teaching, lab facilities as well as the manner in which training was conducted which reflected in the significant gain in knowledge and skills of the participants. These findings are in line with findings of Kumar and Rautray (2005) who found that majority of participant were well satisfied with different aspects of training on mechanization of rice production system.

Table 5: Distribution of respondents based on their degree of satisfaction on different aspects of training programme

n=20

Particulars	Degree of satisfaction Frequency (%)		
	Highly satisfied	Satisfied	Dissatisfied
Positive impact of training for doing the job effectively	13 (65)	7 (35)	0 (0)
General arrangement like boarding, lodging etc of the training programme	6 (30)	14 (70)	0 (0)
Extent of laboratory facilities available for practical session	16 (80)	4 (20)	0 (0)
Opportunities for participation in decision making and planning of the programme	8 (40)	12 (60%)	0 (0)
Behaviour and style of teaching of the faculty	18 (90)	2 (10%)	0 (0)

Overall opinion about training

Opinion from respondents was sought on overall grading of the training programme. It was measured in four categories namely 'excellent', 'very good', 'good' and 'average'. A majority (53.8%) of the trainees graded the training programme as 'very good' while 46.2 per cent felt that it was of 'Excellent' quality. None of the trainees rated this training as good or average. This shows that the Summer School was conducted very successfully and such kind of trainings need to be organized regularly for all the stakeholders.

CONCLUSION

Findings of this study established that there was significant gain in knowledge and skills by the participants which will surely improve the job performance of the trainees ultimately leading to the growth of potato sector in the country. The participation of young trainees in the studied programme was found very less which indicates that young scientists need such training more urgently. It is worth mentioning here that they are more receptive to client's needs and better equipped with latest scientific concepts and are more enthusiastic in accomplishing their duties. It is evident from the study that knowledge level of trainees had increased significantly in all aspects of potato cultivation. The significant gain in knowledge and skills of participants necessitates further increase in the number of such training courses keeping in the view that India ranks very low on potato productivity in spite of being the second largest potato producer in the world. Further, the impact of such programme on actual use of technologies learnt and transferred by the scientists, teachers and extension functionaries need to be assessed for their better refinement in field.

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REFERENCES

Indian Horticulture Database, 2014. National Horticulture Board, Ministry of Agriculture, Govt. of India.

Kalloo, G., Pandey, S.K., Chakrabarti, S.K. and Kaushik, S.K. 2005. Tuber Crop. In Technology for production of quality seed and planting material in Horticultural crops, CPRI, Shimla, pp. 45-66.

Kumar, N. and Biswas, H.S. 2005. Effectiveness and impact of farm machinery training on vocational teachers, In Impact Assessment Studies (Seminar papers

of National Seminar on Extension Methodological issues in impact assessment of agricultural and rural development programmes, January 21-23, 2005) Singh, B., Padaria R.N. and Singh P. (eds): 299-306.

Kumar, N., Rautarary, S.K., Gupta, M. and Singh, A.K. 2005. Impact of summer school on mechanization of rice production system, *Indian Journal of Extension Education*, 41 (1&2):54-57.

Singh, B.P., Rana, R.K. and Govindakrishnan, P.M. 2014. Vision 2050, ICAR-Central Potato Research Institute, Shimla: 26p.

Singh, M.K., Kumar, N., Singh, K.P., Chopade, V. and Dohare. A.K. 2013. Effectiveness and impact of HRD programme on engineering interventions in conservation agriculture, *Indian Research Journal of Extension Education*, 13(1):20-25.