

## Effectiveness and Impact of HRD Programme on Engineering Interventions in Conservation Agriculture

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### ABSTRACT

*The effectiveness and impact of Summer School on Engineering Interventions in Conservation Agriculture for Enhancing Agricultural Productivity and Climate Change Mitigation was conducted during 22 June to 12 July 2012 in which 19 participants from SAU's, ICAR and KVK's participated. Monitoring and evaluation is an in-built mechanism in extension and training system. It serves as a tool for efficient operation of training programme by providing feed-back. It consists of taking corrective measures by course/training coordinator for effectiveness of training programmes. A questionnaire was devised to collect the information about socio-personal characteristics, opinion about Summer School, feedback, knowledge level of participants and the reasons for attending the Summer School. Collected information was analyzed with the suitable statistical tools and techniques. Majority of the participants were in the age group of 30-50 years. All participants were Post-Graduate out of them 68 per cent had less than 10 years service experience. Most of the participants (68%) were Scientist/Assistant professors of engineering stream from State Agriculture Universities. They had very good opinion about the learning experience, use of audio-visual aids including power point projection. More than half (55%) participants expressed that subject matters covered were highly useful. Participants had increased knowledge level and the percent knowledge gain as impact of training was found to be 22.80 per cent at the completion of Summer School. The reasons for attending summer school expressed by the participants were; to promote the farm mechanization (89%) and more than half of the participants had high level of training satisfaction .*

**Key word:** Human Resource Development (HRD); Conservation Agriculture (CA); Engineering Intervention;

**M**onitoring and evaluation is an in- built mechanism in extension and training system. It serves as a tool for efficient operation of training programme by providing feed back. It consists of taking corrective measures by course/ training coordinator for effectiveness of training programmes. CIAE, Bhopal conducted the Summer School on Engineering Interventions in Conservation Agriculture for Enhancing Agricultural Productivity and Climate Change Mitigation from 22 June to 12 July 2012 for 19 participants with a view to prepare trainers of SAUs, KVKs and agricultural officers with participatory mode to equip them with better understanding of Conservation Agriculture and Conservation Agriculture machineries. The impact of the Summer School was assessed by evaluating different component of the programme.

### METHDOLOGY

The evaluation was aimed to know the perception of all the nineteen participants on different aspects of the summer school. The participants were in the cadres of Scientist/ teachers of ICAR Institutes and SAUs. The summer school was conducted in participatory mode to update the SAU/ICAR researchers, teachers and subject matter specialists to the latest knowledge and techniques in Conservation Agriculture.

A questionnaire was devised in consultation with the participants. Socio-personal information of the participants was collected. The opinion of the participants on various aspects of the summer school were recorded viz agree or disagree. Feedback were collected in respect of usefulness of the course: highly

useful/useful/less useful; coverage and quality of presentation: very good/good/ average and time to cover the topics: too long/adequate/short. Feed back with respect to practicals were recorded on a three point continuum: learned e new skill/a known skill further sharpened/no new learning.

To assess the impact of summer school in terms of increase in knowledge level of the participants, knowledge tests were made before and after the summer school. For each of the correct answer of the participants score of one was assigned. The data were statistically analyzed to measure the knowledge gained by the participants after completing the summer school.

To determine the level of satisfaction, the participants were asked to rate the summer school in respect of the course content, way to explain the subject by trainer and relevance of the subject to their need on five pint continuum namely, very well satisfied; well satisfied; partially satisfied; partially dissatisfied; dissatisfied with the scores of 5, 4, 3, 2 and 1 respectively. Accordingly the satisfaction of the participants was classified in to three levels having score> 12 (high) 12-9 (medium) and <9 (low). The maximum and minimum scores were 15 and 3 respectively. The data were presented in frequency and percentage basis to draw inferences. The reasons of attending the summer school by the participants were collected on three point continuum; strongly agree/agree/disagree and expressed in percentage.

**RESULTS AND DISCUSSION**

*Profile and personal characteristics of the participant :* The participants were scientists/teachers/ subject matter specialist of ICAR institutes, SAUs and KVKs from 10 states of the country. All participants were Post-Graduate out of them 68 percent had less than 10 years service experience. Most of the participants

(68%) were Scientist/Assistant Professor of Engineering stream from State Agriculture Universities. The group was heterogeneous in respect of their age, education and service experience. Majorities (89.47%) of the participants were in the age group of 30-50 year and only 10.52 % were below 30 year of age (Table 1). This has shown the need of refresher course for the middle aged group.

*Opinion of the participants on different aspects of the summer school:* All participants expressed the opinion (Table 2) that it was a good learning experience and they gained knowledge and skill by participatory discussion and interaction. Use of AV aids including power point projections were adequate and time was fully and effectively utilized. More than 84 per cent of the participants have fully agreed that knowledge gained by the participation, skill developed by the participation;

**Table 1. Distribution of the participants on the basis of their socio-personal characteristics (N=19)**

Characteristics		No.	%
Age	Below 30 years	2	10.52
	30-50 years	17	89.47
	Above 50 years	0	0.00
Education	Graduate	0	0.00
	Post-Graduate	19	100
Service Exp.	Less than 10 years	13	68.42
	10-20 years	4	21.05
	More than 20 years	2	10.52
Stream	Engineering	11	57.89
	Agriculture	7	36.84
	Other	1	5.26
Designation	Scientist/Asstt. Prof.	13	68.42
	Subject matter Specialist	6	31.57
Organization	SAUs	15	78.94
	ICAR	3	15.78
	Other	1	5.26

**Table 2. Distribution of participants with respect to their opinion on different aspects of the summer school (N=19)**

Opinion/Statement	Fully agree (%)	Agree to limited extent (%)
Knowledge gained by the participation.	89.47	10.52
Skill developed by the participation	84.20	15.78
Training imparted by the lecture followed by discussion.	94.73	5.26
Time fully utilized during the training.	94.73	5.26
Classroom, workshop and laboratory facilities were good.	94.73	5.26
Good atmosphere to exchange ideas freely with faculty members.	84.20	15.78
Lodging arrangement was good	89.47	10.52
Boarding facility was good	94.73	5.26
I would like to participate in other training organized by CIAE.	84.20	15.78

they would like to participate in other training organized by CIAE. Majority of the participants have expressed that boarding and lodging were good.

*Satisfaction of the participants on the summer school course:* Satisfaction of the participants was ascertained with respect to course content, way to explain the subject by trainer and relevance of the course to their need. The study showed that majority 78.94 per cent participants were in the high level of course satisfaction followed by 21.05 per cent with high level of training satisfaction (Table 3). The above rating reflected that the facilities and expertise made available for the summer school were of high standard. These finding is in line with finding of *Kumar (2005)* who found that majority of the participants were found to be well satisfied with various aspects of organization of summer school on mechanization of rice production system.

**Table 3. Level of training satisfaction as perceived by participants (N=19)**

Category	No.	%
High (>12)	4	21.05
Medium (12-9)	15	78.94
Low (<9)	0	0.00

**Table 4. Participants opinion about matching of course with their expectation (N=19)**

Criteria	Participants feed-back (%)
<i>Level of course</i>	
Very high	5.26
High	31.57
Just right	57.89
Low	5.26
Very low	0.00
<i>Daily schedule</i>	
Very tight	0.00
Tight	21.05
Comfortable	78.94
Light	0.00
Very light	0.00
<i>Expectations</i>	
Much more than expected	0.00
More than expected	52.63
As expected	47.36
Less than expected	0.0000
Much less than expected	

*Expectations from course :* Participant's opinion about level of course, daily schedule and matching with expectations from the course was collected and summarized in Table 4. Majority (57.89%) of the participants found the course was to be of 'Just right' level. Again (78.94%) of the participants rated that the

daily training schedule was 'Comfortable'. Over 50 % participants found that the training course was more than their expectations (Table 4).

*Knowledge gained by participants :* The information regarding to the pre and post knowledge scores and knowledge gained by the participants was examined and the results were presented in Table 5. The study showed that pre-entry knowledge of the participants was 63.60 percent which increased to maximum actual gain of 22.80 per cent over their pre-knowledge score. This indicates that participants had articulated keen interest in learning different technologies confabulated during training programme. The significant knowledge gain might be due to fact that the summer school was well planed and designed to suit the job needs of the participants. This result of the study is in line with the finding of *Singh et al. (2007)* and *Mahipal et al. (1997)* who found that 19.90 percent and 28.70 per cent increase in knowledge on various areas of evaluation and improved farm technology respectively due to training.

**Table 5. Impact of summer school training on improving knowledge level (N=19)**

Subject Score	Pre-training score	Post-training score
Max score (A)	21	21
Mean knowledge score	13.36	18.15
Knowledge gap of participants	7.63 (D)	2.84 (G)
Knowledge of participants (%)	63.6	86.42
Gap in knowledge of the participants (%)	36.33	13.52
Standard Deviation	3.91	1.30
Gain in knowledge	= D-G = 4.79 = J	

Knowledge gain as impact of training (%) (K) =  $\frac{K-J}{A} \times 100 = 22.80$

't' value = 5.06\*\*

\*\* Significant at 1 percent level of probability

The feed-back showed that the utility of the subject matter/topics covered was highly useful and useful as expressed by the majority of the participants (Table 6). For the coverage and quality of the presentation more than three 80 per cent participants have rated very good and good. They expressed that the resource persons were highly competent and devoted to classes. For the importance to the topic covered 57 and 84 per cent participants had rated that topics on Ergonomics and Instrumentation are highly useful and useful respectively. The time allotted for the each subject/topics was

**Table 6. Participants Opinion about the Topics Covered (N=19)**

Session Topic	Importance			Content/Presentation			Time Period		
	HU	U	LU	VG	G	A	TL	Ad	S
Conservation Agriculture	53.50	41.22	5.26	52.63	47.36	0.00	0.00	92.98	7.01
CA Machinery	49.12	48.24	2.63	46.49	45.61	7.89	0.87	87.71	11.40
Economics	26.31	57.89	15.78	31.57	52.63	15.78	5.26	84.21	10.52
Data analysis	15.78	84.21	0.00	14.03	70.17	15.78	1.75	96.49	1.75
Energy	36.84	59.64	3.50	35.08	57.89	7.01	0.00	94.73	5.26
Instrumentation	31.57	63.15	5.26	29.82	52.63	17.54	5.26	80.70	14.03
Mechanization	38.59	56.14	5.26	40.35	43.85	15.78	1.75	92.98	5.26
Precision Farming	47.36	47.36	5.26	52.63	42.10	5.26	10.52	42.10	47.36
Crop Residues Management	52.63	47.36	0.00	26.31	68.42	5.26	5.26	94.73	0.00
Carbon Sequestration	52.63	47.36	0.00	26.31	68.42	5.26	5.26	94.73	0.00
Soil Conservation	45.26	53.68	1.05	35.78	61.05	3.15	2.10	86.31	11.57
Institute Visit	31.57	60.52	7.89	21.05	68.42	10.52	0.00	89.47	10.52
Ergonomics	57.89	36.84	5.26	52.63	42.10	5.26	0.00	94.73	5.26
Irrigation	36.84	63.15	0.00	42.10	55.26	2.63	0.00	94.73	5.26

HU = Highly Useful, LU = Less Useful, U = Useful,  
 TL = Too Long, Ad = Adequate, S = Short,

VG = Very Good, G = Good,  
 CA = Conservation Agriculture A = Average,

adequate as expressed by more than 85 per cent of the participants expect for few topics. Forty seven and fourteen percent of the participants expressed that the time required to cover the topics: Precision farming and instrumentation were short.

*Feed-back of participants on practical class* : The study showed that all the participants had acquired several new skills due to summer school. A list of some of most important skills acquired by the participants is given in Table7. Majority of the participants have

expressed that the practical classes conducted in the summer school helped them to learn new skill and also helped them to further sharpen their known skill in respect of equipment, field practice with power tiller and animal drawn matching equipment, mulch laying cultivation practices, instrumentation, methods of measurement, test techniques, calibration, utilization of surplus crop residues, Measurement of soil physical properties and Field operation of laser guided land leveller etc. (Table 7).

**Table 7. Feed-back of participants on practical classes (N=19)**

Opinion/Statement	Learned a new skill (%)	A known skill further sharpened (%)	No new learning (%)
Visit to Precision Farming Development Project	47.36	52.63	0.00
Demonstration and field practice with power tiller and animal drawn matching equipment	31.57	63.15	5.26
Practical on mulch laying cultivation practices	78.94	21.05	0.00
Practical on plant protection machinery	52.63	42.10	5.26
Demonstration of soybean processing and utilization machinery and value added products	73.68	26.31	0.00
Visit to PPC- Demonstration of workshop machines, tooling's and processes for quality manufacturing of conservation agriculture equipment	73.68	15.78	10.52
Sensors and instrumentation for measurement of performance parameters of equipment (Practical	57.89	42.10	0.00
Field practice with bed cultivation equipment	68.42	31.57	0.00
Practical on Measurement of soil physical properties	42.10	42.10	10.52
Calibration and demonstration of seeding/planting machines suitable for conservation agriculture	57.89	31.57	5.26
Field operation of laser guided land leveller	73.68	15.78	5.26
Practical on Utilization of surplus crop residue	73.68	21.00	0.00

**Table 8. Distribution of participants based on their views to attend the summer school (N=19)**

Possible reasons for attending the summer school	SA (%)	A (%)	D(%)
To learn in-depth about the improved agricultural tools/implements/machines	68.42	31.57	0.00
To get practical training about improved agricultural tools/implements/machines	78.94	21.00	0.00
To train the sub-ordinates/ farmers about the improved tools/implements/machines after taking the training	63.15	36.84	0.00
To establish rapport and linkage with CIAE scientists for further help	31.57	63.15	5.26
To get certificate of the training course for further promotion	21.00	63.15	15.78
To join the course by force, as I was nominated for the course	0.00	0.00	100
To promote the farm mechanization for increasing production and productivity	89.47	10.52	0.00
To keep away himself from regular working environment for few days	5.26	21.00	73.68
To visit the venue (City)	10.52	36.84	52.63

SA=Strongly agree (%)

A=Agree (%)

D=Disagree (%)

**Views of the participants for attending the summer school :**

Views of participants were ascertained based on the reasons given by them for attending the summer school (Table 8). Almost all the participants stated that they have joined the summer school to promote the farm mechanization for increasing production and productivity, to get practical training about improved tools/implements/machines, to learn in depth about the improved agriculture tools/implements/machines, to train the sub-ordinates/farmers about the improved tools/implements/machines after taking the training. Around 63 percent participants have agreed that they have joined the summer school to establish rapport and linkage with CIAE scientists for further help and to get certificate of the training course for further promotion. More than 70 percent of participants have expressed their view by disagreement that they have joined the course by force being nominated for the course and to keep away himself from regular working environment for few days.

**Suggestion for improvement :** The participants of the summer school had given several suggestions for its improvement. The most important suggestion as pointed out by the 79 per cent of the participants was to have more exercise on statistical analysis of data. The next important suggestion was to provide more practical class on utilization of surplus crop residues. The other suggestion were related to provide lecture on development of low cost site specific CA technologies, for having more practical on water management, precision farming and CA machinery. Two suggestions were related to arrangement for visiting the CA practicing farmers and to have arrangement for more than one visit to CFMT&TI, Budni. They were also demanded for lecture on Computer Aided Design & CAM (Table 9).

**Table 9. Suggestion for improvement (N=19)**

Suggestions	%*
To have more exercise on statistical analysis of data	78.94
To provide lecture on development of low-cost site specific CA technologies	68.42
To provide more practical on utilization of surplus crop residues	63.15
To provide more practical on water management and precision farming	57.89
To make arrangement for field visit to CA practicing farmers	52.63
To provide more practical on CA machineries	42.10
To have arrangement, more than one visit to CFMT&TI, Budni	31.57
To make arrangement for lecture on Computer Aided Design & CAM	26.31

\* Multiple responses

**General feedback on the summer school :** Majority of the participants (78.94 %) have expressed that the daily schedule of classes was comfortable. Local field trips were useful to them. Majority of the participants have expressed that the practical classes conducted in the summer school helped them to learn new skills regarding Conservation Agriculture machineries. They were satisfied with the 21 days duration of the summer school and recommended that June/July months were the appropriate period to organize the summer school.

**CONCLUSION**

The participants rated that the summer school on School on Engineering Interventions in Conservation Agriculture for Enhancing Agricultural Productivity and Climate Change Mitigation was a good learning

experience: they gained knowledge and skill through participatory discussion and interaction and they fully and effectively utilized the time. Around 94 per cent of the participants have agreed that Training imparted by the lecture followed by discussion and Classroom, workshop and laboratory facilities were good.

Majority of participants have rated highly useful/very good/adequate for course coverage, technical competency of the faculty, quality of presentation and

time allotted for each topic. They have expressed their opinion that they would like to participate in another such programme when organized in similar fashion.

The feed back in general have revealed that the summer school was planned with expert faculty members and organized effectively satisfying the need and requirement of the participants

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