Ind. Res. J. of Ext. Edu.–Vol. 2, No. 1, Jan. 2002

INDIGENOUS KNOWLEDGE FOR CONTROLLING THE PESTS OF SOYBEAN CROP : AN APPRAISAL OF RESURCE-POOR FARMER'S WISDOM

Ranjay K. Singh[1], V. K. Pyasi[2] & L. N. Sharma[3]

Indigenous knowledge is dynamic changing through indigenous mechanism of creativity and innovativeness as well as through contact with other local and international knowledge system. These knowledge systems may appear simple to an outsider but they represent mechanism to ensure minimal livelihoods for local people. Indigenous knowledge system are often elaborated and they are adapted to culture and environmental conditions (Warren, 1989). Indigenous knowledge systems (IKS) are tuned to the need of local people and the quality and quantity of available resource. They pertain to various cultural norms, social roles or physical condition. Thus, efficiency of IK is crucial factor in the series of sustainable development of agriculture.

The present study aims at preparing an inventory of indigenous knowledge systematically on the basis of in-depth study of high land agri-ecosystem. Conceptualization by way of abstracting indigenous knowledge and subjecting the indigenous practices to scientific validity with the help of formal R and D methods are its major refrain. The study of indigenous knowledge system benefits more the formal research and development than the farmers themselves. The present state of affairs related to agriculture vis-a-vis the need for an overall development strategy based on environment sustainability is any indication. Keeping in view the importance of indigenous agricuitural knowledge, an attempt has been made to conduct the study with the following objectives :–

1. To identify and document the indigenous practices and their processing methods against insect pests of soybean crop.
2. To know the extent of easiness in availability of indigenous practices.
3. To know the period and percentage of adoption regarding indigenous practices.
4. To know the farmer's perception regarding efficacy level of indigenous practices.
5. To know the factors responsible for continuance of indigenous.

METHODOLOGY :

The present study is completely field research by following participant observations and group discussions with the farmers. the place of study was the southern part of Satpura plateau, Chhindwara district of Madhya Pradesh. From the 50 km^2 area of soybean cropping systems, 7 villages were selected randomly for the purpose of investigation. Category of resource-poor soyean growers had been determined on account of resources inventory viz., size of land holding, irrigation potentiality, type of soil, number of crops taken in one cropping years, management system, farming experience, number of training received and secured enterprises other than agriculture. Farmers having experience more than 15 years in growing soybean crop on more than 1-acre of land have been identified. After three round group discussions 104 resource poor soybean growers were selected randomly for the investigation. Participant observation with the structured interview scheduled was used for getting the response of the farmers. To measure the accessibility, period of adoption and extent of education of indigenous practices self-rating scale was used.

1. Ph. D. scholar, 2. Asso. Prof., 3. Prof. and Head, Deptt. of Extn. Edu., JNKVV. Jabalpur, MP.

RESULTS AND DISCUSSION :

After conducting the research as per the objectives researchers has found following interesting results regarding the insect pests of soybean crop and there management wise indigenous practices.

A. Identified indigenous practices and their processing methods :

1. Dry Mahua flowers (*Madhuka latifolia*) : During the observation it has been observed that the farmers uses dry *Mahua* flower, which has been noted first time in the use of insect control. Farmers apply this practice at the rate of 10 to 15 kg. per hectare without any other mixture and it is most easily available to the whole community, without bearing any cost. The new insect *Scalopendra spp, which attacks the crop at 5 to 6 leaf stage* is controlled effectively with the practice of the *Mahua* flower. After feeding the flower, insect becomes unconscious for 20 to 25 days and the crop becomes safe from this insect.

2. Green Neem leaves (*Azardirachta indica*) : In case of Neem extract for controlling different insects, farmers collect 6-8 kg. fresh leaves of Neem, put them in 10 litre of water and boil it till the mixture turns dark brown in colour. After 10 to 12 hours, 80 to 100 litre of clean water is mixed in it and solution is sprayed on the crop as per requirement to control the *Oberia brevis, Dicrisia obliqua* and other insect of soybean.

3. Dry leaves of tobacco (*Nicotiana spp*) : 1.5 to 2 kg. dry leaves of tobacco is boiled in 5 to 6 litre of water till the solution remains 1 to 1.5 litres and turns dark black in colour. Then it is filtered after 10 to 12 hours of boiling periods and is mixed with 80 to 90 litres of fresh water for 1 hectare and sprayed in the early morning to control the larvae of *Heliothis armigera.*

4. Green hedge of Ipomea (*Ipomea fistula*) : The processing of *Ipomea* leaf extract is a little bit difficult due to its poisonous nature. Farmers collect 1000-1200 fresh leaves with buds from the hedge of *Ipomea* species. The collected leaves are put in 30-35 litre of water and boiled until water turns milky white. This toxic solution containing *Ipomose* and *Anthacin Glucoside* controls the larvae of *Heliothis,* spotted bollworm and armyworm. Farmers reported that this solution have to be sprayed within four days from its preparation.

5. *Asafoetida* : The processing of the *Asafoetida* solution to control larvae of *Heliothis* and some small insects is very simple. This material is to extent costly for the resource poor farmers and available in the market. Doses of 100 to 150 grams of asafoetida per litre of water is boiled for 10 to 15 minutes and sprayed after cooling with 40-50 litres of fresh water per hactare.

6. *Ayurvedic Dinkamali* : *Dinkamali* is one of the Ayurvedic medicine used for the stomach problems of human being and available in market @ Rs. 20 per 100 grams. For controlling *Heliothis* larvae on soybean crop and some small insects in the vegetable crops like cauliflower, tomato and cabbage, farmers use *Dinkamali* @ 250-300 grams per hectare. The process of making extract is the same as *Asafoetida* solution processing but period of boiling is longer (25-30 minute) than the *Asafoetida* boiling period.

7. Boiled extract of larvae of infested insect : As a surprise, a unique practice has been observed that some resource rich and resource poor farmers collected the larvae of the major insects, especially girdle beettle and *Heliothis* in the quantity of 2 kg. to 2.5 kg/ha. and boil it, then sprayed over the soybean crop for controlling the same larvae. The process of boiling

and making the solution of larvae is mixing of 2 to 2.5 kg. collected larvae of same insect in 2.0 litre of clean water and it is boiled for 45-60 minutes till the water turns dark brown. After 5 to 6 hours, the solution is mixed with 25-30 litre of fresh water and sprayed over the crop. Due to the foul odour of solution (as a replicant) the larvae of insects escape from soybean field and very soon the field becomes free from this affected larvae.

Table 1. Response distribution of the farmers about easiness in availability of indigenous practices for use (n = 104)

Sl. No.	Name of the Indigenous practices	Extent of easiness in the availability		
		ME	E	LE
1.	Dry Mahua flower	95 (91·35)	09 (8·65)	00 (00·00)
2.	Green leaves of Neem	90 (86·54)	07 (6·73)	07 (6·73)
3.	Dry leaves of Tobacco	90 (86·54)	07 (6·73)	07 (6·73)
4.	Green leaves of ipomia hedge	104 (100)	00 (00·00)	00 (00·00)
5.	Asafoetida	40 (38·46)	45 (43·27)	19 (18·27)
6.	Aurvedic Dinkamali	30 (28·85)	18 (17·31)	50 (48·08)
7.	Larvae of Heliothis and Girdle beetle	104 (100)	00 (00·00)	00 (00·00)

ME = Most Easily, E = Easily, LE = Least easily, Data in parenthesis is percentage

It is persual from the empirical data presented in the Table 1 that, majority (93.33%) of the farmers reported that dry *Mahua* flower (*Madhuka latifolia*) is most easily available to them on account of abundant number of tree in the area. Similar results were obtained for the availability of green leaves of Neem (*Azadirechta indica*) (86.54%). Dry leaves of Tobacco (*Nicotiana spp.*) and green leaves of Ipomea hedge (*Ipomia fistula*) are also easily available to be users, which is justified by the response of 86.54 and 100.0 per cent of the farmers respectively.

Although farmers do not grow the Tobacco plant and it is available by paying very low cast. In case of availability of Asafoetida is little bit difficult as reported by 43.27 per cent of the farmers on account of its cost bearing nature and availability in the market. Similarly Dinkamali is also available to the farmers in the same way as Asafoetida that is reported by 16.67 per cent of soybean growers and it is least easily available to the 48.08 per cent of the farmers. about one third (28.85%) percentage of farmers reported that this biorational is most easily available to them. On account of heavy occurrence of larvae of the girdle beetle, it is a good source of making bio-pesticide, which is available from the same field where it is to be applied. Hundred per cent of the farmers reported that this practice is available them most easily.

B. Period and percentage of adoption of indigenous practices :

The period and adoption of different indigenous practices are presented in the following Table-2. During the observations it has been observed that all the different indigenous practices for using against insect pests of soybean crop were not similar with regards to period of adoption. Table-2 depicts that dry *Mahua* flower is used by cent per cent farmers from last five years to control the new pest *Gaygwalan* incidence on account of as a single technology. A higher percentage over 48.0 percent of the farmers reported that they are using *Neem* decoction from last ten years. Similarly majority (57.69%) of the farmers revealed that they are adopting ipomia decoction for last ten years. Very little percentage (18.27%) of the farmers indicated that they are adopting same practice from last five years. Over two third (67.31%) percentage of the farmers adopting the Asafoetida from last ten years. However this practice is cost bearing and available in the market. Looking to its good efficacy, farmers bear it and adopt for the pest management of crop.

Table 2. Response distribution of the farmers about period and percentage of adoption of the indigenous practices

(n = 104)

Sl. No.	Name of the indigenous practices	Extent of period and of adoption		
		From last 15 years	From last 10 years	From last 5 years
1.	Dry Mahua flower	00 (0·00)	00 (00·00)	104 (100)
2.	Green leaves of Neem	30 (28·85)	50 (48·08)	24 (23·08)
3.	Dry leaves of Tobacco	25 (24·04)	45 (43·27)	24 (23·08)
4.	Green leaves of ipomia hedge	25 (24·04)	60 (57·69)	19 (18·27)
5.	Asafoetida solution	15 (14·42)	70 (67·31)	19 (18·27)
6.	Aurvedic Dinkamali solution	00 (32·69)	40 (38·46)	30 (28·85)
7.	Larvae of Heliothis and Girdle beetle	6 (5·77)	30 (28·85)	68 (65·38)

** Data presented in parenthesis is the percentage.*

Dinkamali is one of the Aurvedic medicines available in the market by cost paying are mostly adopted by poor people for the stomach pain. Looking to the rationality of Dinkamali being integrated this bio-rational as a arsenals against the pest management after its trial and error basis result from last ten years. Over 38.46 percent of the farmers are using this practice while 32.69 per cent of farmers are adopting from last 15 years. During the observation farmers had reported that they have developed the bio-pesticides from the larvae of girdle beetle to control the same pest. This practice is more encouraging and adopted by more than 65.0 per cent of the farmers from last five years while about one-third (28.85%) percentage of farmers using this practice from last 10 years. Similar finding were also reported by Dasgupta and Pal (1998).

C. Efficacy level of the indigenous practices as perceived by the farmers :

Testing of the scientific efficacy of indigenous practices is the crucial process for the validation of indigenous knowledge. Looking to this issue, an attention has been paid to know the efficacy level of each identified practice in terms of farmers' experience. It is evident from the Table-3 that out of total farmers, majority (86.54%) of them had pointed out that adaptation of dry Mahua flower is quite effective against the new pest Gaygwalan. As per the response of the farmers (94.23%), decoction made from the green Neem leaves is found to be most effective against the *Oberia brevis* and *Dicrisia obliqua*. Very little percentage of the farmers (1.92%) had explained about the least efficacy for the same practice.

Table 3. Response distribution of the farmers about efficacy of identified indigenous practices

(n = 104)

Sl. No.	Name of the indigenous practices	Controlled major pest	Extent of efficacy		
			MEf	Ef	LEf
1.	Dry Mahua flower	Scalopendra spp. (Indentified new pest)	90 (86·54)	10 (9·62)	04 (3·85)
2.	Green leaves of Neem	Oberia bervis and Dicrisia obliqua	98 (94·23)	04 (3·84)	02 (1·92)
3.	Dry leaves of Tobacco	Larvae of Heliothis and pod borrer	92 (88·46)	08 (7·69)	04 (3·85)
4.	Green leaves of ipomia hedge	Larvae of Heliothis and spotted bollworn	90 (86·54)	10 (9·62)	04 (3·85)
5.	Asafoetida solution	Larvae of Heliothis and Melonogromyza	70 (67·31)	20 (19·23)	14 (13·46)
6.	Dinkamali solution	Heliothis and other small insects	67 (64·42)	30 (28·85)	07 (6·73)
7.	Larvae of Heliothis and Girdleb eetle	Larvae of Heliothis and Girdle beetle	57 (54·81)	42 (40·38)	05 (4·81)

** MEf = Most effective, Ef = Effective and LEf = Least effective* ** Data in parenthesis is percentage.*

The similar results have been obtained by the 88.46 per cent of the farmers regarding

the most efficacy of the decoction prepared for the dry tobacco leaves against the *Melonogromyza phasioli* and larvae of the Heliothis. The farmers' experience (86.54%) indicates that, use of decoction prepared from the Ipomia hedge against the larvae of Heliothis and Spotted bollworm is found to be most effective while remaining farmers (13.47%), showed that this practice is found to be moderate effective to least effective against the same insect.

As pointed out in the earlier discussions that asfoetida and *Dinkamali* are the cost bearing technology and it is market purchasable input. These practices are most preferred by the resource-rich farmers while the resource-poor farmers less prefer it. So far as concern about the efficacy level, majority (67.31%) of the farmers had reported that this practice is most effective against the larvae of Heliothis and Melonogromyza while 33.08 percent of the farmers' experience indicates that,asafoetida is moderate to least effective against the same insects. More or less similar variations could be observed regarding the response of farmers towards the efficacy level of the *Dinkamali* solution. Application of boiled larvae solution prepared from the same infested girdle beetle larvae to control the same pest is one of the unique practices done by the farmers. This most effective to control the girdle beetle as reported by the 54.81 percent of the farmers. While a group of 40.38 per cent farmers explained that this practice is effective on an average.

D. Factors responsible for the continuance of indigenous practices :

As per the perception of the farmers, few factors were identified which are responsible for the continuance of indigenous practices. Indentified factors are presented in Table-4. The presented empirical data in the Table-4 revealed that, majority over 80.00 per cent of the farmers reported that cost effective nature of the indigenous practice is the first factors for its continuance min the pest management practices. The next three important factors for the continuance of the practices as reported by the farmers were easy availability of inputs, eco-friendly nature and rationality of the indigenous practices which got second, third and fourth ranks. The indigenous practices are still invogue in the use on account of the local knowledge, compatibility with the farming system, prevents maximum losses, compatible with the socio-cultural conditions and needed little skill in the handling.

Table 4. Factors responsible for the continuance of the indigenous practices.

(n=140)

Sl. No.	Responsible factors	Percentage of response	Ranks
1.	Prevents maximum losses	61·53	VII
2.	Compatible to the farming system	64·42	VI
3.	Easy to handle	50·00	X
4.	Easy availability of inputs	72·12	II
5.	Based on local knowledge	65·38	V
6.	Rationality	69·23	IV
7.	Eco-friendly	70·19	III
8.	Cost effective	80·78	I
9.	Needed little skill	55·76	IX
10.	Compatible to the socio-cultural situations	60·57	VIII

The study finds support with the work of Thomas *et al.* (1990), Bunch (2000) and Umarani *et al.* (2001) as these scientists also found similar results in their studies regarding the use of indigenous practices against the recommended practices.

CONCLUSION :

Inspite of all efforts to make available technology for cultivation of soybean, it was discovered that farmers were using their local traditional wisdom. The identified practices used by the farmers for controlling insects pests of soybean in most interesting. Especially the result of Mahua flower first time noted for the use in most effective for the new insect of soybean *Scalopendra* Spp. In another practice *Dinakamal* (ayurvedic medicine) was also noted first time as the practice for use in the field pest management. Farmers are competent to make the bio-pesticide, which is depicted from the use of boiled extract of larvae of infested insects. The identified and documented indigenous farmer's practices should be included in packages of technology for transfer of appropriate blending of scientific recommendations which could be made used for effective generation and transfer of local specific appropriate technology by conducting the on-farm research. This will inculcate to blend the tested farmer's practices with their own recommendations for achieving the higher production and achieving the sustainability. Such practices will also be more acceptable to farmers on account of its legitimacy in the social system, which will lead for the better people's participation. There is an urgent need to provide the feed back to scientists community regarding the farmers perception of the recommended technology and also the local practices of the farmers by organizing the meeting, seminars, workshops, conferences, symposium and publication of proceedings.

REFERENCES :

1. Bunch, R. (2000) : Keeping it Simple : What Resource-poor Farmers Will Need From the Agricultural Engineers During the Next Decade. Special issue, Plenary Session of Agril. Eng. 2000, July Warwiek, U.K. Selected Conference Proceedings., J. Agri. Engg. Res. Vol. 76 (3) : 305-315.
2. Das Gupta, D. and Pal, P.K. (1998) : Attributes of Indigenous Knowledge : Mean for Generating Appropriate Agrotechnology. Proceeding of National Symposium on Agrotechnology Transfer for 2001 A.D. (Nov. 28-30, 1998) : 153-159.
3. Thomas, J.K., Lading, H., and McIntosh, W.A. (1990) : The Adoption of Integrated Pest Management Practices Among Texas Cotton Growers, Rural Sociology. 55 (3) : 395-410.
4. Umarani, R., Subramaniyan, K., and Arulmozhi, N. (2001) : Sustainability of Agricultural Technologies. Kisan World, Vol. 28 (4) : 14.
5. Warren, D.M. (1989) : Indigenous Knowledge-A definition CIKARD News, Vol. 1, No. 1, pp-5.

❑❑