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INDIGENOUS TECHNOLOGICAL PRACTICES FOLLOWED BY WHEAT GROWERS IN RAJASTHAN

M. L. Meena* and Aishwarya Dudi**

ABSTRACT

A study was conducted among 120 farmers sampled from four districts representing irrigated wheat eco-system, rainfed low land eco-system, dry land and upland eco-system in the arid zone of Rajasthan state. Indigenous practices related to wheat cultivation were documented using open-ended questions developed in the form of check list. Findings of the study revealed that summer ploughing (79%) and in-situ burning of wheat stable (38.33%); growing green manures in summer (75.00%); placing weight on soaked seed (48.33%) were some of the traditional practices frequently done by the large number of farmers for the activities like land preparation, green manuring and seed treatment respectively. The study further revealed that farmers sowed wheat seed in furrow methods mainly in the *barani kheti*. Most common practices related to management of insect pest, rodents and birds were dusting of ash (37.50%), tying white flags in the wheat fields to scare rodents (45.83%) and use of polythene cover (65.83%). Similarly, on the aspects of post harvest management it was found that '*Mara*' was used by number of sampled farmers (95.83%).

INTRODUCTION

In recent years there has been a growing scientific interest in locally developed farming systems and technologies. The traditional practices that rely on indigenous knowledge are considered productive, sustainable, stable and equitable. Moreover as indigenous knowledge is passed on from one generation to another by word of mouth in most cases unless conscious efforts are made to collect and document them, valuable information may be lost. There is a need for the systematic documentation of farmers' traditional knowledge into an "information bank" from which agronomists, extension workers and other farmers can draw enlightenment and insight. However, collection and documentation of these practices is not the only requirement. This in fact many not take us very far unless the scientific rationale behind each of the traditional practices is probed into (Talwar and Singh, 1993). In this study, indigenous practice was operationally defined as resource saving, site-specific, farmers-devised technologies, experimented and adopted by themselves, which is simple to practice, flexible to use and sustainable in efficient. In this context, the present study was taken up to document the indigenous practices of wheat growers and to analyze the rationale behind the practices of indigenous technologies by the wheat growers.

RESEARCH METHODOLOGY

Four districts representing different eco-systems viz., Jodhpur district for irrigated wheat eco-system, Pali district for rainfed low land eco-system, Jalore district for semi-arid and Barmer district for dryland eco-system were purposely selected. From each of the identified district, one block was purposely selected based on the area under wheat cultivation. From each block, one gram panchayat was chosen and from each gram pachayat, 30 wheat growers were selected randomly for the study. Thus, a total of 120 farmers from four eco-systems constituted the sample. In the information sought, some items are mutually exclusive while the ITK practices have from none to single, double and multiple choices.

RESULTS AND DISCUSSION

Indigenous practices followed by wheat growers with respect to land preparation.

In the case of land preparation, 37.50 per cent of the farmers were burning previous crop stubbles as depicted in Table1.

* SMS (Agricultural Extension), CAZRI, Krishi Vigyan Kendra Pali-Marwar (Rajasthan).
** SMS (Home Science), CAZRI, Krishi Vigyan Kendra, Pali-Marwar (Rajasthan).

Table 1: Indigenous practices followed by wheat growers with respect to land preparation (n=120)

S. No.	Practices	Frequency	Per cent
1	Burning of previous crop stubbles-in situ	46	38.33
2	Summer ploughing	95	79.17
3	Small section bunds at shorter intervals	19	15.83

It was practiced to get rid of weeds, killing soil borne insects and pathogens, to eliminate/eradicate non-crop plants in the field and to enrich soil nutrients potassium. The fact is that the soil burning was a practice to clean field in short time. About 79.17 per cent of the farmers practiced summer ploughing in the summer fallows. Farmers believed that resting stages of insects and pathogens get destroyed when exposed to sunlight, weed growth could be eliminated by deep and frequent summer ploughing and hardening of laterite soil with the result of moisture reduction, deep ploughing loosen the soil and help in soil moisture conservation.

In the irrigated wheat eco-system, one can observed the wheat fields with quite a number of bunds across the slop. This practice was followed by 15.83 per cent of the wheat growers. The wheat grown in irrigated situation is based on flooding. Hence, the runoff of the water was checked using small bunds at short intervals. The findings confirmed with findings of Karthikeyan, *et al*. (2006). Indigenous practices followed by wheat growers with respect to green manure and farm yard manure.

Table 2: Indigenous practices followed by wheat growers with respect to green manure and farm yard manure (n=120)

S. No.	Practices	Frequency	Per cent
1	Growing green manure crops in summer	90	75.00
2	Incorporation of green leaves during harrowing	45	37.50
3	Applying farm yard manure	64	53.33

From Table 2, it can be observed that growing green gram manure crops in summer was practiced by 75.00 per cent of the farmers. After harvesting, the crop stubbles are incorporated into the soil.

This practice helps in utilizing the residual moisture for decomposition to form organic matter, loosening the soil structure and enhancing the soil fertility by nitrogen immobilization. Incorporation of green leaves during pudding like thick leaves of sunnhemp, d*encha*, pigeonpea, cowpea and green gram was practiced by 37.50 per cent of wheat growers with belief that it would improve the soil structure, texture and soil fertility and also minimize the toxic residual effects. Some green leaves may also have anti-insecticide and anti-fungicidal properties. Farm yard manure application was followed by 53.33 per cent of the farmers. The reasons cited were that it would improve the soil structure, soil tilth and soil fertility and increase the moisture infiltration and microbial activities as well as add the essential micronutrients to the soil. The findings confirmed with the findings of Prasad (2009).

Indigenous practices followed by wheat growers with respect to seed and seed treatment.

Table 3 reveals that about 22.50 per cent of the wheat growers practiced selection of early matured early earheads. The farmers believe that early matured earheads collected from healthy tillers will be free from pests.

Local varieties were used by 20.83 per cent of the farmers. The reasons may be that these were found to be resistant to common pests and diseases, tolerant to irregularities of irrigation, tastier than that of high yielding varieties and good quality wheat straw with better yield. Soaking of wheat seeds in water for better germination was practiced by 30.00 per cent of the farmers. Water is the most important requirement for germination of wheat seed. Soaking of seeds was practiced to remove the hardness of the seed coat, which can enhance the germination percentage.

Placing weight on soaked seeds in gunny bags was practiced by 48.33 per cent of the growers of wheat. According to farmers, soaked seeds of wheat under pressure generates heat and hastens the germination process. The rate of all bio-chemical reac-

tions increases with the increase in temperature. Mechanical pressure created within the gunny bag helps the plumules to emerge during germination. Soaking wheat seeds in cowdung slurry was practiced by 32.50 per cent of the farmers. Farmers presume that it increased germination, protect the seeds from pests in the field, absorb the nutrients present in it and also act as a booster dose for seeds. It has anti-insecticidal and fungicidal properties also.

Indigenous practices followed by wheat growers with respect to sowing and field preparation

Table 3: Indigenous practices followed by wheat growers with respect to seed and seed treatment

S. No.	Practices	Frequency (n=120)	Per cent
1	Selection of early matured earheads	30	25.00
2	Use of local varieties	25	20.83
3	Soaking of wheat seeds in water for germination	36	30.00
4	Placing weight on soaked seeds	58	48.33
5	Soaking wheat seeds in cowdung slurry	39	32.50

In the Table 4, it was mentioned that sowing practices of seeds in *Barani* was followed by 46.67 per cent of the wheat growers.

The reasons is that they believe, that crops sown during the 15th November provided better yield, less insects and diseases incidence may also help to take up subsequent crops on time. Line sowing of seed opposite to wind direction was followed by 16.67 per cent of the farmers. This practiced minimize damage occurring due to strong wind blown on the field and also to avoid lodging.

Indigenous practices followed by wheat growers with respect to control of pests

The data in Table 5 depict the method followed to control insects' pests, rodents and birds menace spraying of soap water was practiced by 08.33 per cent of the farmers. It helps to control the wheat bug. Indigenous way of controlling the insect by keeping pests of red ants was practiced by 04.67 per cent of the farmers.

Table 4 Indigenous practices followed by wheat growers with respect to sowing and field preparation (n=120)

S. No.	Practices	Frequency (n=120)	Per cent
1	Sowing practices of seeds in furrow for better germination	56	46.67
2	Sowing seeds apposite to sun light	20	16.67

The red ants are found to control insects like wheat bug, leaf rollers and hoppers biologically. Thus, it is an effective biological control for a short-term basis. Pulling ropes dipped with kerosene over the crop was followed by 07.50 per cent of the farmers. A long rope covering the size of the individual wheat plots was dipped in kerosene. This kerosene rope was held by two persons across the plot of the wheat field and it was dragged to smear the crop from one end to other end. The caterpillars and other small insects holding on the crop will fall unconscious due to small and contact of kerosene. This practice was followed when wheat field was irrigation with water for insects to drain off. The practice of placing spider web in the wheat field was followed by 08.33 per cent of the farmers. Spiders' predators on several insects like leaf eaters, caterpillars, beetles, leaf hoppers and act as a biological control. Control of pest by use of broom made out of different plant twigs was practiced by 10.83 per cent of the wheat growers. This practice will remove the larva and small insects, which are clinging to crop. About 12.50 per cent of the farmers practiced spraying of garlic and asafetida solution to control bug infection. Practice of keeping lime, groundnut cake, *neem* cake over bunds followed by 16.67 per cent of the farmers. It may help to control the crabs in the wheat field. Dragging thorny plant branches over the crop practice was followed by 15.00 per cent of the farmers. The thorny branches of stern like *khejari* helped in removing the larva and other small insects infecting the crop mechanically. *Neem* cake application was practiced by 17.50 per cent of the farmers. *Neem* cake is known as high value manure that also possesses good insecticidal properties.

Table 5: Indigenous practices followed by wheat growers with respect to control of pests (n=120)

S. No.	Practices	Frequency	Per cent
Insect pests			
1	Spraying of soap water	10	08.33
2	Placing nest of red ants	05	04.67
3	Pulling ropes (lipped in kerosene)	09	07.50
4	Encouraging of spider web	10	08.33
5	Broom - plant twigs	13	10.83
6	Spraying garlic and asafetida solution	15	12.50
7	Keeping lime, groundnut and *neem* cakes on bunds	20	16.67
8	Dragging thorny (*khejari*)	18	15.00
9	Application of *neem* cake	21	17.50
10	Keeping kerosene soaked gunny bags	20	16.67
11	Dusting of ash	45	37.50
Rodents			
1	Fixing coconut petioles inverted	05	04.17
2	Strong and well plastered bunds	09	07.50
3	Smoke if front of rodent holes	18	15.00
4	Bait for natural killing (*Glyricidiun*)	25	20.83
5	White flag in field to scare the rodents	55	45.83
Birds menace			
1	Use of audio-videotapes	08	6.67
2	Use of crackers	12	10.00
3	Human scare-crows in wheat field	18	15.00
4	Use of polythene covers tying to stick	79	65.83

Practice of keeping kerosene soaked gunny bags at water inlets was followed by 16.67 per cent of the farmers. This practice was also helpful in controlling wheat bugs as in the case of spraying the crop with soap water. Kerosene acts mainly as a repellent for bugss. Ash dusting practice was followed by 37.50 per cent of the wheat farmers. The ash dust was able to control all type of insects affecting the wheat crop. Sometimes this was more effective than chemical sprays. For the control of wheat bugs ash was more effective than sprays. Fixing coconut petiole inverted was practiced by 04.17 per cent of the farmers. The coconut petiole fixed inverted on the ground resembles the shape of the owls from the distance this makes the rats to get alight. Strong and well plastered bunds in the wheat field with less width were followed by 07.50 per cent of the farmers. Usually rodents make burrows in the bunds. So a strong and well-plastered bund keeps off the rodents from burrowing. Bunds with less width will be difficult for rodents to make burrow because water will enter into the holes. Blowing smoke in front of rodent holes was done by 15.00 per cent of farmers. Rodents get killed due to fumigation and suffocation inside the burrow in this method.

About 20.83 per cent of the farmers practice bait for natural death using *Glyricidium sepium* which seems to result in natural death and hence do not give rise any suspicion among the other rats. Hence, even after the death some other rats also consume this poison without any suspicion. Thus the population of rats gets reduced in the wheat field. The crushed leaves and seeds of *Glyricidium sepium* are used with wheat in the ratio of 1:1 proportion. Fixing of white flags in field was followed by 45.83 per cent of the wheat growers. White colour scares some of the wild animal pests.

A few 06.67 pre cent farmers used old and discarded audio and videotapes tied to wheat field across borders of bunds to scare the birds. The shining and vibration of audiotapes and videotapes during sunshine and also flutter sound might scare the birds from the field. Use of crackers for scaring birds was followed by 10.00 per cent of the wheat growers. Cracker sound is effective to scare for birds and rodents from approaching the wheat field. This was done at germination stage after sowing and grain

maturing stage. About 15.00 per cent of the farmers practiced fixing of human scare-crows in the field. It is tied to a long pole and placed in the fields in order to scare birds at field preparation and seed ripening stage. It serves as visual frighteners. The practice of tying of used polythene cover to stick and placed at the wheat field was followed by 65.83 per cent. With the blow of wind the polythene sheet flaps and flutters and the sound produced wards off birds by scaring them. The findings are confirmed with the findings of Jagadish, *et al*. (2009).

Indigenous practices followed by wheat growers with respect to post harvest

The findings in Table 6 reveals that threshing of wheat bundles manually by using wooden blocks or benches was practiced by 33.33 per cent of the wheat growers. It is a method of mechanically separating seed from the straw, developed by their own invention.

Table 6: Indigenous practices followed by wheat growers with respect to post harvest (n=120)

S. No.	Practices	Frequency	Per cent
1	Threshing of wheat bundles	40	33.33
2	Stone roller for threshing	06	05.00
3	*Mara* for winnowing	115	95.83
4	*Meti* for separating wheat straw	45	37.50
5	Seed drying shrunken embryo	60	50.00

Use of stone roller and cattle for threshing was followed by 05.00 per cent of the farmers to get the remaining seed separated from the straw after manual threshing. *Mara* for winnowing practice was followed by 95.83 per cent of the wheat growers *Mara* is made out of locally available bamboo and is very light in weight. Thus, it is easy lo lift do winnowing operation. Hence, this practice followed by most of the wheat growers. *Meti* was used to separate wheat straw from the grains by 37.50 per cent of the farmers. It is made of bamboo stick with a metal hook, easy to handle, amidst heap of straw on the threshed wheat to separate the straw from the wheat grains and reduces drudgery and increases efficiency. Seed drying-shrunken embryo was practiced by 50.00 per cent of farmers. It is a technique where the seeds are exposed to different climate, three dews (nights) and corresponding three days successively. This practice may help farmer for longer storage of the seeds either for future sale or letter consumption. If the seeds are not properly dried, there is a chance of damage of grains due to dampness, or infection and pests attack. In case of some traditional varieties which are cultivated only once in a year, the seeds are renewed by this process. The findings confirmed with the findings of Deepesh, *et al*. (2005).

Indigenous practices followed by wheat growers with respect to storage

Delay in storing of grains after drying was followed by 25.00 per cent of the farmers. Farmers do not store grains as soon as they dried in sunlight. Table 7 explains that bamboo basket, *Kheep*, earthen pot and gunny bags for storage was adopted by 75.00 per cent of the farmers. The reasons may be that the materials are easily available, cheap and can be shifted from place to place. It maintains good aeration during storage. Bamboo and cowdung are believed to have some insect repellant properties. Therefore, the farmers store grains in bamboo baskets plastered with cowdung. The findings confirm with the findings of Barotia, et al. (2010) and Meena and Dangi (2010).

It is thought that if the grains are stored immediately after sun drying there will be steaming effect. This may lead for accumulation of moisture in the stored grains causing fungal infection. Use of *neem* and *Dhatura* leaf to control storage pests was practiced by 77.50 per cent of the farmers. The leaves of these plants may act as an insect repellent.

CONCLUSION

It can be concluded from the above discussion that, the indigenous agricultural practices followed by the wheat growers were fairly good. Agricultural Universities should rationalize and standardize these practices which are eco-friendly, low cost and easily manageable. Further, it needs popularization by the state department of agriculture, state agriculture universities and other concerned departments. This study may motivate the researchers to take up such studies with respect to different crops and in other areas so that in future a compendium of

Table 7 Indigenous practices followed by wheat growers with respect to storage (n=120)

S. No.	Practices	Frequency	Per cent
1	Bamboo basket, *Kheep*, earthen pot and gunny bags	90	75.00
2	Delay in storing the grains	30	25.00
3	Use of *neem* and *Dhatura* leaves	93	77.50

ITK could be developed in general in the field of agriculture.

REFERENCES

Balmatti, A. (2000). Indegenous technologies in agriculture cropping system in North Karnataka. *M. Sc. Thesis (Unpublished),* UAS, Dharwar.

Deepesh, P.C., Bhagat, R. and Rao, D.U.M. (2005). Indigenous knowledge of Kaippad Rice Agro-ecosystems. *Indian Journal of Extension Education,* Vol.41 (1&2):74-75.

Jagdish, K.N., Nanjappa, D. and Narasimha, N. (2009). Indigenous practices followed by paddy growers. *Indian Journal of Extension Education*, Vol. 45 (1&2):73-78.

Karthikeyan, C., Veeragavathatham, D., Karpagamand, S. and Firdouse, S.A. (2006). Indigenous low cost technologies for sustainable dry land agriculture. *Indian Journal of Extension Education*, Vol. 42 (3&4):27-31.

Prasad, M.V. (2009). Indigenous knowledge use in maize cultivation in Andhra Pradesh. *Indian Research Journal of Extension Education*, Vol.9 (1):65-68.

Talwar, S. and Singh, Y.P. (1993). In search of wisdom among the farmers of arid agriculture documentation and analysis. Paper presented at National Seminar on *Indigenous Technologies for Sustainable Agriculture*, held at IARI, Pusa New Delhi.12-14.

Barotia, P., Sisodia, S.S. and Upadhyay, B. (2010). Indigenous knowledge of farmers about neem. *Rajasthan J. Ext. Edu*. **17&18**:132-135.

Meena, S.R. and Dangi, K.L. (2010). Traditional wisdom among the tribal and non-tribal farmers in the post-harvest technology of food grains. *Rajasthan J. Exte. Edu*. **17&18:**152-159.

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