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## Extent of adoption ITKS on plant protection and post-harvest technology by tribal farmers in Telangana region

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### Abstract

This study was conducted in Adilabad, Khammam and Warangal districts of Telangana. Ex post-facto research design was followed in this study, since different variables chosen for the study had already occurred. An effort was made to document the indigenous technology of tribal farmers. A study was conducted aiming to document and categorize the existing ITKs of tribal areas in Telangana region their rationality and validity, perceived attributes, attitude, extent of adoption, relationship and finally conclude with different strategies for scientifically rationale and valid indigenous agricultural practices. A total of 297 ITKs were documented from 216 tribal farmers across the study areas. Of the 297 ITKs could be observed that Majority 21.21 per cent of ITKs were related to general agriculture and 16.49 per cent were related to plant protection and post-harvest technology remaining were of other crops. For testing the extent of adoption ITK on Plant protection and post-harvest technology questionnaire containing lists of ITKs was prepared. A structured schedule was framed, pre- tested and the data were collected from 216 respondents whether the indigenous practices adopted completely adopted, Partially adopted and not adopted by the tribal farmers with frequency and percentage. From the findings it was revealed that Out of 41 ITKs on plant protection more than 50 per cent of the respondents adopted 27 ITKs (65.87%) completely, 14 ITKs (31.71%) partially adopted and remaining 1 ITKs (2.43%) was not adopted.

**Keywords:** Plant protection, technology, tribal farmers

### Introduction

The tribals in the district are mostly below poverty line, isolated from present day development and basically survive on subsistent agriculture and largely primitive in nature (Indigenous practices). Tribals are generally steeped with lot of superstitious and primitive beliefs. Some of the beliefs play a vital role in deciding the sustainability of a technology to reduce the cost of cultivation and to propagate eco-friendly agriculture (Sundaramari and Ranganathan, 2003) [5]. ITKs are broader based, ecologically sound, environmentally safe, socially acceptable and economically resilient. Identifying, documentation and incorporation of indigenous knowledge systems into agriculture extension organisations is essential to achieve sustainable agriculture development (Rajasekharan, 1993) [3]. Tribal farmers have been continuously undertaking a variety of experiments with nature over centuries, the results of which have accumulated as Indigenous Technical Knowledge (ITK). Though they followed and passed on over generations, it is necessary to understand the scientific rationale underlying each of the ITKs so as to validate and disseminate them through various extension programmes through extension organizations is essential to achieve sustainable agriculture development (Rajasekharan, 1993) [3]. Hence 41 ITKs A structured schedule was framed, pre- tested and the data were collected from respondents whether the indigenous practices adopted completely adopted, Partially adopted and Not adopted by the tribal farmers with analysis of frequency and percentage.

### Methodology

The study was conducted by adopting an ex-post-facto research deign method was primarily used to study the Attitude of farmers towards indigenous practices. The study was conducted in the Adilabad, Khammam and Warangal district of Andhra Pradesh during 2012-13. Out for each district 4 mandals were selected, thus 12 mandals were selected for the study. Three village from each mandal was selected for the study. Thus a total of 36 villages were selected randomly. Six farmers from each village will be selected randomly, thus a total sample of 216 respondents were selected for the study.

A structured schedule was framed, pre- tested and the data were collected from respondents. The data collected on extent of adoption of tribal farmers were processed and interpreted through frequencies and percentages

### Result and discussion

The findings from the Table 1 shows that, out of 41 ITKs on plant protection more than 50 per cent of the respondents adopted 27 ITKs (65.87%) completely, 14 ITKs (31.71%) partially adopted and remaining 1 ITKs (2.43%) was not adopted by more than 50 per cent of respondents and it is depicted in the figure No.24.

The 26 ITKs (63.41%) completely adopted more than 50 % of the respondents were ITK No. 2, 4, 6, 7, 9, 11, 12, 15, 16, 18, 19, 20, 21, 22, 23, 25, 26, 29, 31, 32, 34, 35, 36, 37, 38, 39. and 40 The higher adoption of the ITK No. 9 (Dehusking and crushing cereals, millets and pulses is done by use of indigenous made stone crusher called *thiragali* (Vernacular name)) was because of unavailability of alternative methods, which suits to small scale processing of millets and pulses in tribal region.

The ITK No. 19 previous *kharif* season seed material is used for the coming *kharif* season was because they cannot afford buying seed material from outside. They utilize their own seed for sowing next season and they feel that their seeds are healthy and tolerate to pest and disease.

The ITK No. 23 (Neem seed extract solution is prepared and sprayed to control boll worm and pod borer of pigeon pea and chickpea) was because easily availability of the neem seeds in their surroundings and in the forest which contain insecticidal properties like Azadiractin, which controls the insect when applied. It is cheap and best and not creating environmental damage.

The higher adoption of the ITK No. 16 (Maize cobs are kept long period without remaining husk and tassel to avoid stored pests and prolonged viability), the ITK No. 11 (Sorghum seeds are stored in the gummis by mixing ash and neem leaves and sealed with cow dung to avoid the insect pest), ITK No 12 (Seeds are stored in the gunny bags mixed with Seethaphal (Vernacular name) leaves + cowdung ash to prevents storage pests) and the ITK No. 22 (Pulses are stored in bamboo baskets with ash for longer period to avoid pest attack) indicate the storage of the sorghum and maize by traditional method ie. gummis and baskets, drums which is made up of locally available material, to protect the seeds from pest.

The ITK No. 17 (Manual beating on a wooden tables and crushing the rice straw with animals is practiced), ITK No.2 (They beat empty tins with a stick to scare away wild animals and birds that destroy crops.), ITK No 4 (Bamboo sticks tied with bird feathers are erected in the field to avoid bird attack), ITK No. 6 (Wood is burnt at the field boundaries to protect the crop from wild animals), ITK No.7 (Odesella is a rope made with a pouch tied with a string thus releasing the stone to a greater distances chasing away the birds), ITK No 20 (Wood is burnt in the field boundaries to protect the crop from wild animals) and the ITK No 30 (Farmers burn trash around the field to attract adults and nymph of insects) higher adoption because farmers doesn't have other alternative. The usage of beating empty tins, bird feathers tied to bamboo stick and wood is burnt around the field to award away the animals. The ITK No. 18 (Before harvesting the crop few rice spikelet were hanged in front of house for eating by sparrows) because of their tradition and beliefs.

The higher complete adoption of ITK No. 9 (calotrophis leafs are spread in the safflower field to attract *bihar hairy caterpillar*), ITK No.26 (farmers grow jatropa plants around the ground nut field, which acts as catch crop against red hairy caterpillar) ITK No. 31 (stem borer is managed by tribals pouring neem kernel extract in the whorls), ITK No.32 (Terminal clipping in bengal gram is practiced by tribal to avoid *helothis* egg laying), ITK No.34 (Maize cobs were covered by polythene cover to protect from bird damage) and ITK No. 35 (Maize cobs are hanged to the roof without removing leaf sheath to avoid rat and insect damage) spread of *calotrophis* leafs and *jatropa* around redgram field attract hairy caterpillar and terminal clipping in bengal gram was done to avoid egg laying by *helothis* and also maize cobs are covered with polythene sheet and hanged to roof with leaf sheath to avoid from rodent damage, insect and bird damage.

The ITK No.21 (burning the stalks is practiced by the farmers to reduce scale and aphid attack in red gram), ITK No.23 (To control the pod borer in red gram spraying of neem seed kernel extract is sprayed on crop) ITK No.25 (Ash along with FYM improves the quality of turmeric and reduces the rhizome rot) burning stalks create heat flies and sucking pests were attracted to fire and killed. The pod borer in redgram is controlled by neem extract which contains insecticide called Azadiractin properties to control pests. Practicing ash and FYM treatment to rhizomes reduces the rot.

14 ITKs (34.14%) partially adopted by more than 50 per cent of respondents were ITK No. 3, 5, 8, 10, 13, 14, 17, 24, 27, 28, 30, 33 and 41 The IIK No.27 (farmers used to burn trash adjacent to the groundnut fields during nights to attract nymphs and adults of) ITK No. 28 (farmers move the rope in the paddy field to reduce the leaf folder insects), ITK No 33 (Wood is burnt in the boundaries to protect the crop from wild animals), ITK No.24 (Leaf blotch disease can be controlled by planting dried palmyrah leaves in the turmeric field) and the ITK No.41 (Indigenous arrows (Banalu)are used to ward off wild animals which damage food crops.) were partially adopted by more than 50% of the respondents this is because the pulling rope in paddy field for removal of leaf folder some time damage the plants and it requires skilled labour. Collection of wood and burnt in the field to scare away animals is time taking process.

The ITK No.3 (Placing of ash at the base of the stem to protect from the termites) ITK No.8 (Grains are stored in the gunny bags and kept on big wooden beams to avoid the damage of rats) and the ITK No.14 (Yerrathega + cow dung ash + neem leaf are mixed and used for storing green gram, blackgram and cowpea, millets in gadellu to avoid pest attack) was partially adopted by more than 50% of the respondents. This is because they don't have other alternative methods for storing seeds and collection of raw material for constructing the drums and gummies. The storage structures prepared by them is time taking and difficult.

The ITK No.10 (The liquid extracted from the Kodishaku is insecticidal, when sprayed on infested paddy fields for controlling the pests.) and the ITK No 13 (The seeds challejinjalu and mustiginjallu available from the forest are crushed and the liquid extracted is used as an pesticide) was partially adopted by more than 50 % of the respondents this is because collecting of seeds and other plants which have insecticidal properties is difficult task. The leafs kodishaku, chellingellu and Mustigingellu do not have insecticidal properties to control pest when sprayed on the crop.

**Table 1:** Item-wise extent of adoption of ITKs on Plant protection and post-harvest technology (n=216)

ITK No	Indigenous Technical Knowledge (ITKs)	CA F	CA %	PA F	PA %	NA F	NA %
1	Burning the dry stalks in the field and spraying cattle urine for control of pests and diseases.	42	19.44	65	30.09	109	50.46
2	Beating empty tins with a stick to scare away wild animals, birds that destroy crops.	131	60.65	81	37.55	4	1.85
3	Placing of ash at the base of the stem to protect from the termites.	82	37.96	114	52.78	19	8.7
4	Bamboo sticks with bird feathers are erected in the field to avoid bird damage.	119	55.09	75	34.72	22	10.18
5	Polythene sheets tied to the bamboos sticks generate sound due to blowing air which scare away the rats.	88	40.74	110	50.93	16	7.40
6	Wood is burnt at the field boundaries to protect the crop from wild animals.	116	53.70	84	38.89	16	7.40
7	Odesella is a rope made with a pouch tied with a string thus releasing the stone to greater distances chasing away the bird.	112	51.85	81	37.5	23	10.65
8	Grains are stored in the gunny bags and kept on big wooden beams to avoid the damage of rats.	82	37.96	121	56.01	13	6.01
9	Dehusking and crushing cereals, millets and pulses is done by use of indigenous made stone crusher called <i>Thiragali</i> (vernacular name).	135	62.5	75	34.72	6	2.77
10	The liquid extracted from the Kodishaku as insecticidal properties when sprayed on infested paddy fields, to control the pests.	65	30.09	109	50.46	42	19.44
11	Sorghum seeds are stored in the gummis by mixing with ash and neem leaves and sealed with cow dung to avoid insect attack.	121	56.02	86	39.81	9	4.17
12.	Seeds are stored in the gunny bags mixed with Seethaphal (vernacular name) leaves + cowdung ash to prevent storage pest attack.	136	62.96	75	34.72	5	2.31
13.	The seeds challaginjal and mustiginjal available from the forest are crushed and the liquid extracted is used as a pesticide.	68	31.48	110	50.93	38	17.59
14.	Yerrathega + cow dung ash + neem leaf are mixed and used for storing green gram, blackgram and cowpea, millets in gadelu to avoid pest attack.	75	34.72	125	57.87	16	7.41
15	Maize cobs are kept long period without remaining husk and tassel to avoid stored pests and prolonged viability.	118	54.63	72	33.33	26	12.04
16	Manual beating on a wooden tables and crushing the rice straw with animals is practiced.	131	60.65	76	35.19	9	4.17
17	Storing sesamum seeds with ash is practiced to increase its keeping quality.	64	29.63	109	50.46	43	19.91
18	Pulses are stored in bamboo baskets with ash for longer period to avoid pest attack	112	51.85	76	35.19	28	12.96
19	Neem seed extract solution is prepared and sprayed to control bollworm and pod borer of pigeon pea and chick pea	128	59.26	81	37.50	7	3.24
20	The latex of calatrophis diluted with 15 parts of water for control of caterpillars in cotton.	108	50.00	75	34.72	33	15.28
21	Burning the stalks is practiced by the farmers to reduce scale and aphid attack in red gram.	114	52.78	83	38.43	19	8.80
22	Pods which are not infested with any pest and disease are selected for seed purpose for next year.	120	55.56	75	34.72	21	9.72
23.	To control the pod borer in red gram, farmers spray neem seed kernel extract on the crop.	115	53.24	83	38.43	18	8.33
24	Leaf blotch disease can be controlled by planting dried palmyrah leaves in the turmeric field.	73	33.80	113	52.31	30	13.89
25	Ash along with FYM improves the quality of turmeric and reduces the rhizome rot	109	50.46	83	38.43	24	11.11
26	Farmers grow jatropa plants around the groundnut field, which acts as catch crop against red hairy caterpillar.	115	53.24	75	34.72	26	12.04
27	Farmers used to burn trash adjacent to the groundnut field's during nights to attract nymphs and adults of insects.	82	37.96	121	56.02	13	6.02
28	Farmers move the rope in the paddy field to reduce the leaf folder.	82	37.96	114	52.78	19	8.80
29	Calatrophis leaves are spread in the safflower field to attract bihar hairy caterpillar.	119	55.09	75	34.72	22	10.19
30	Yellow stick traps are installed in the cotton field to attract whitefly and jassid.	88	40.74	110	50.93	16	7.41
31	Stem borer is managed by tribal pouring neem kernel extract in the whorls.	118	54.63	72	33.33	26	12.04
32	Terminal clipping in bengal gram is practiced by tribal to avoid <i>Heliothis</i> egg laying.	131	60.65	76	35.19	9	4.17
33	Wood is burnt in the boundaries to protect the crop from wild animals.	64	29.63	109	50.46	43	19.91
34.	Maize cobs were covered by polythene cover to protect from bird damage.	112	51.85	76	35.19	28	12.96
35	Maize cobs are hanged to the roof without removing leaf sheath to avoid rat and insect damage.	121	56.02	86	39.81	9	4.17
36	Digging trenches around the field to ward off wild boar.	116	53.70	84	38.89	16	7.41
37	Beating empty drum is practiced by triba to ward off wild animals and birds.	112	51.85	81	37.50	23	10.65
38	There will be no incidence of pest and disease if neem leaves are applied as basal manure.	110	50.93	90	41.67	16	7.41
39	Tribal now and then beats cardboards with a stick to scare away the animals and birds which destroy the crop.	112	51.85	85	39.35	19	8.80
40	Stones are used by the tribal to kill wild animals which destructs the crops like Maize, Sorghum.	120	55.56	95	43.98	1	0.46
41.	Indigenous arrows (Banalu) are used to ward off wild animals which damage food crops.	75	34.72	110	50.93	31	14.35

## Conclusion

Indigenous technologies have strong roots in tribal culture. The study reveals that there were nearly 297 ITKs on various crops cultivated in the study area. These ITKs may be documented, tested, verified, and standardized for the possibility of blending with modern technologies for profitable and environmental friendly agriculture. The extension personnel while encouraging

the continuous use of rational ITKs may suitably educate their clientele to discontinue the irrational ITKs. Farmers were found to have more favourable attitude towards ITKs, hence these can be effectively utilized by the extension personnel in dissemination of information on ITKs. The efforts of different agencies in promotion of ITKs can be effectively utilized in sustainable agriculture.

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