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Adoption of indigenous technologies in pulse cultivation

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Abstract

A large number of Indigenous Technical Knowledge (ITK) is available with our farmers. Only few attempts have been taken up by social scientists to document the available indigenous knowledge items and to analyze them in pulse cultivation. Keeping this in view, the study was carried out in Thanjavur, Pudukkottai, Tiruvarur districts of Tamil Nadu. In each district five blocks were selected for the study. Three hundred pulse growers were selected in selected villages of three districts. Data were collected with well-constructed pretested interview schedule. The documented 66 indigenous technologies were taken for the study. Majority of the pulse growers adopted the indigenous practices like plough intensively than extensively, raising one row of red gram crop with two rows of black gram crop to control pests and disease, October month having conducive climate for boll worms in pulses to avoid this month to escape from boll worm attack and spacing between red gram crops to be increased to control boll worms. Majority of the respondents had medium level of adoption on indigenous technological practices.

Keywords: Adoption, indigenous technology, practice wise adoption, pulse growers

Introduction

Pulses are one the staple food and major contributor of protein. Pulses is being produced worldwide in 81 million ha area and a tune of total production of 73.21 million tonnes with an average productivity of 904 kg per ha. In India 305.32 lakhs ha area and a tune of total production of 199.8 lakhs metric tonnes and an average productivity of 654 kg per ha. India has key place in global pulses production and contributes about 25per cent to the total pulse basket. About a dozen of pulse crops, namely chickpea, pigeonpea, mungbean, urdbean, lentil, field pea, lathyrus, cowpea, common bean, mothbean, horsegram are cultivated in different agro-ecological regions.

Pulses are one of the oldest crops in Tamilian Culture. Pulses growing farmers are cultivating pulses with local own technologies right from seed germination, plant nutrition, plant protection and storage to value addition. A large number of Indigenous Technical Knowledge (ITK) is available with our farmers. These ITK practices need to be documented, validated and popularized in such a way that maximum benefits can be derived for the farming community. However, only few attempts have been taken up by social scientists to document the available indigenous knowledge items and to analyze them. Keeping this in view the present study was undertaken to identify the adoption of documented indigenous technologies in pulse cultivation.

Research Methodology

The study was undertaken among 300 pulse farmers in Thanjavur, Pudukkottai, Tiruvarur districts. The districts were selected based on the maximum number of pulse farmers and area under pulse crop. In each districts five blocks were selected based on the area under pulse crop. Two villages were selected in each selected blocks of each districts. Ten pulse farmers were selected randomly in each village and totally 300 pulse farmers were selected for this study. A well-constructed pretested interview schedule was used to collect the adoption of indigenous technology. Adoption in the study has been optional zed as, whether an individual practiced each of the selected indigenous knowledge items. The respondents were narrated about the selected indigenous knowledge items one by one, each time enquiring whether they adopted the practice in the previous years. If the answer was 'Yes' a score of one and if the answer was 'No' then no score was assigned. The scores for all the practices were added up for each respondent and his adoption score was arrived at.

Result and Discussion**Adoption level of indigenous technologies**

The adoption level of indigenous technologies in pulse cultivation was collected from the pulse farmers. The results are presented in the table 1.

Table 1: Adoption of indigenous technology in pulse cultivation

S. No	Indigenous Technology	Number	Per cent
Land Preparation			
1.	Achieving fine tilth is better than applying manures	118	39.33
2.	It is better to plough intensively than extensively	285	95.00
3.	It is better to have deep ploughing rather than shallow ploughing for pulse growth	267	89.00
4.	Plough four times for garden land	212	70.67
5.	Plough seven times for wet land	201	67.00
6.	Summer ploughing gives good crop in the ensuing season	198	66.00
7.	Mixing and applying coir waste with compost to arrest soil hardening	207	69.00
8.	Manuring and Mulches	178	59.33
Seeds and Sowing			
9.	Yield of the crops depends on seed quality, before sowing, knowing the quality of seed.	187	62.33
10.	Seed should be a dried one because well dried seeds will have higher longevity and keeping quality.	198	66.00
11.	It is better to change the seeds atleast once in two years	205	68.33
12.	The seeds are generally stored along with the leaves of neem, pungam, notchi and thulasi	212	70.67
13.	Better to start planting from "Sanimoolai" (North East) of the field to get higher yields.	199	66.33
14.	Severing the broadcasted seeds in dry lands with soil	167	55.67
15.	Better to perform sowing and planting operations during evening hours	154	51.33
16.	The best seasons for pulse sowing are "Thai pattam" & Chithraipattam	134	44.67
17.	The pulse crop sown on new moon day escape from pest and disease	257	86.00
18.	Pulse sowing is done on all days except Tuesday and Saturday	143	47.67
19.	Yield will be lower in black gram crop if it is sown in snow season/heavy mist season	156	52.00
20.	Pulse sowing in September second week, given better yield.	187	62.33
21.	Micronutrient mixture liquid form	109	36.33
Manuring			
22.	Applying water hyacinth plants either as a compost or as burnt ash to the field for supplying potash	200	66.67
23.	Poultry manure & goat manure gives benefits to pulse crops grown in the same season	256	85.33
24.	Higher Blooming of "Tamarind" is. considered as an indication for good pulse production and higher blooming of "Mango" is considered as an indication for poor pulse production	278	92.67
25.	Sheep penning results in more pulse yield	265	88.33
26.	Perennial Vegetation is grown in the irrigation channel converted in to green manure.	284	94.67
27.	DAP spraying during full moon season, enhances more flowering	267	89.00
28.	Red gram is also used as a green manure crop which improves the soil fertility	298	99.33
Pest and disease management			
29.	Growing cow pea as a green manure to control nut grass	267	89.00
30.	Growing horse gram to control nut grass.	254	84.67
31.	To avoid to cultivate pulse crop during severe summer season	223	74.33
32.	Spray neem oil 5 lit./ac to control downey mildew disease in pulses	221	73.67
33.	Spray purified milk to control yellow mosaic disease in cow pea and black gram.	231	77.00
34.	Pulse crop mixed with Sorghum to control wilt disease in pulse.	212	70.67
35.	Pulse crop mixed with "Marigold" to control pest in pulses.	265	88.33
36.	Spray Panchakavya in pulse crops to control yellow mosaic disease.	234	78.00
37.	Spray Navakavya in pulse crops to control many diseases in pulses also get good yield.	245	81.67
38.	Pulse crops rotation with sorghum and rice to control wilt disease	251	83.67
39.	In pulse crops, sprinkling common salt to control wilt disease.	281	93.67
40.	Light trap & small lamps are placed on either side of the house entrance light from the lamps act as light trap the farmers are also to identify the pest outbreak.	216	72.00
41.	Kitchen ash is applied in pulse crops to control aphids.	271	90.33
42.	In pulse crops to control sucking pests, spray tobacco powder, cow urine, and neem oil spray.	290	96.67
43.	In pulse crops to control nematodes, pungam (Pungamiapinnata) or illuppai (Bassic Latitolia) cakes are applied.	217	72.33
44.	In pulse crops, spray panchakavya solution to add micronutrients,	199	66.33
45.	Dried fish extract solution spray in pulses to control many pests.	187	62.33
46.	Spray tobacco decoction to control warm and sucking pests in pulses.	167	55.67
47.	Grinding the leaves of "Ipomiocornia" soaking in water 15 days, filtering and spraying to control boll warm in red grams.	201	67.00
48.	Using pest avoidance technique	201	67.00
49.	Seed treatment with "Asafotida") to control boll warm in red gram.	226	75.33
50.	Spacing between red gram crops to be increased to control boll warms.	287	95.67
51.	Raising one row of red gram crop with two rows of black gram crop to control pests and disease	286	95.33
52.	October month having condusive climate for boll warms in pulses to avoid this month to escape from boll warm attack.	276	92.00
53.	Raising Coriander crop to control boll warm in pulses	196	65.33

Seed storage and post harvest technologies			
54.	Mixing the green gram seeds with sand before storage.	133	44.33
55.	Black gram grains broken in to halves will escape from weevil attack during storage	138	46.00
56.	Castor seeds are fried, powdered and mixed with red gram seeds to reduce pest attack during storage	276	92.00
57.	Pulse seeds in earthen pots mixed with wood ash to keep away from storage pests	256	85.33
58.	Red gram seeds are mixed with red earth slurry, dried and stored to avoid storage pests.	254	84.67
59.	Dry the red gram seeds well and store them in gunny bags after placing dried leaves of "Naithulasi" (<i>Ocimum canum</i>) inside them to prevent pod borer.	285	95.00
60.	Vegetable oil and castor oil are mixed with pulses before storage	236	78.67
61.	Mixing pulse grams with dried chilies to increase the keeping quality and avoid from storage pests like "brooches"	278	92.67
62.	Spread cooked rice in the field bund to attract birds; these birds collect/eat warms in pulse field.	243	81.00
63.	Dusting ash along with pulse seeds to control storage pests.	222	74.00
64.	Neem seed kernel extract is the general organic pesticide used to control many pests in pulses	190	63.33
65.	Neem seed cake mixed with seed pulses to preserve in container to avoid storage pests.	189	63.00
66.	10 Kgs. pulse seeds mixed with 500 gm. of turmeric power, 500 ml. groundnut oil for storage even for one year	178	59.33

Land preparation

Among the eight indigenous technologies in land preparation, intensive ploughing and deep ploughing rather than shallow ploughing indigenous technologies was adopted by the majority of the pulse farmers with 95.00 per cent and 89.00 per cent respectively. They expressed that the intensive and deep ploughing will store more rain water when compared to shallow ploughing and also it will remove the weed roots and egg masses in turn it will leads to less weed population and pest problem in pulse crop. Ploughing based on the soil types is required one to get fine tilth. Garden land should be ploughed four times to get good crop and it was adopted by 70.67 per cent of farmers. Wet land should be ploughed seven times to get fine tilth and it was adopted by 67.00 per cent of farmers. Summer ploughing gives good crop in the ensuring season indigenous technologies was adopted by 66.00 per cent of pulse farmers. Also getting fine tilth condition of soil is more important than applying manures and it was adopted by 39.33 per cent of farmers. Soil in fine tilth condition will observe rain, facilitate germination and also it will facilitate the root growth. Mixing and applying coir waste with compost to arrest soil hardening indigenous technology was adopted by 69.00 per cent of farmers and manuring and mulches indigenous technology with 59.33 per cent of adoption. Maintaining optimum moisture is the pre requisite for uniform growth. Composting (or) Waste material application will maintain the soil health. Composting is an aerobic process and compost material always keeps the wetness for long time. It will prevent the soil hardening

Seeds and Sowing

Seeds and sowing time is very important in pulse cultivation and it will decide the quantity and quality of pulse production. In seeds and sowing thirteen indigenous technologies were documented. Sowing the pulse crop during full moon day escape from pest and disease indigenous technology was adopted by 86.00 per cent of farmers followed by storing of pulse seed with neem, pungam, notchi and thulasi leaves with 70.67 per cent of adoption. By the effect of cosmos (geomagnetic waves) reduce the pest attack by tuning farming to the rhythms of nature on full moon day. Seeds mixed with neem leaves, pungam leaves, notchi leaves and thulsi leaves will act as pest repellent to control pulse beetle and lesser grain borer. Changing the seed material once in two years was adopted by 68.33 per cent of farmers followed by use of well dried seeds with 66.00 per cent of adoption, planting good quality seed and knowing the quality of seed before sowing with 62.33 per cent of adoption, sowing the seeds during evening time indigenous technology was adopted by 51.33 per cent of farmers. Also sowing the pulse crop during Thai

pattam and Chithiraipattam resulting more yield indigenous technology adopted by 44.67 per cent of farmers. Avoid the sowing of pulse crop during snow season and heavy mist season to prevent yield loss indigenous technology was adopted by 52.00 per cent of farmers followed by sowing the seed except Tuesday and Saturday to avoid yield loss indigenous technology was adopted by 47.67 per cent of farmers. Sowing the pulse crop during second week of September to get better yield indigenous technology was adopted by 62.33 per cent of pulse farmers.

Manuring

Almost all the farmers (99.33 per cent) adopted the redgram as green manure crop to improve the soil fertility. The placing the uprooted Redgram plants in the field will serve as a mulch and soil amendment. Majority of farmers (94.67 per cent) was adopted the indigenous practice of mulching the perennial vegetarian grown in the irrigation channel in to the field as green manure. Also majority of the pulse farmers (92.67 per cent) adopted the Higher Blooming of "Tamarind" is. Considered as an indication for good pulse production and higher blooming of "Mango" is considered as an indication for poor pulse production indigenous technology. DAP spraying during full moon season enhances the yield practices was adopted by 89.00 per cent of farmers. Majority of the farmers (88.33 per cent) adopted the sheep penning in the field to more yield. Poultry manure and goat manure application to more yield was adopted by 85.33 per cent of farmers followed by water hyacinth compost with 66.37 per cent.

Pest and disease management

Farmers adopted several indigenous technologies in pest and disease management aspect of pulse crop. Twenty five indigenous technologies were adopted by pulse farmers in pest and disease management practices. Almost all the farmers were adopted the control sucking pests, spray tobacco powder, cow urine, and neem oil spray (96.67 per cent), Spacing between red gram crops to be increased to control boll warms (95.67 per cent), Raising one row of red gram crop with two rows of black gram crop to control pests and disease (95.33 per cent), sprinkling common salt to control wilt disease(93.67 per cent), October month having conducive climate for boll warms in pulses to avoid this month to escape from boll warm attack. (92.00 per cent), Kitchen ash is applied in pulse crops to control aphids (90.33 per cent) and growing cow pea as a green manure to control nut grass (89.00 per cent). Majority of the farmers growing horse gram to control nut grass (84.67 per cent), pulse crop mixed with marigold to control pest adopted by 88.33 per cent of pulse

farmers, spraying purified milk to control yellow mosaic diseases in cow pea and black gram with 77.00 per cent of adoption, spraying panchakavya in pulse crops to control yellow mosaic in pulses and also to get good yield with 81.67 per cent of adoption, pulse crop rotation with sorghum crop with 83.67 per cent of adoption and spraying tobacco decoction to control warm and sucking pests in pulses with 55.67 per cent of adoption. Common salt spray can cause damage by desiccating the spores of fungus. Salt and coconut oil with detergent soap solution will fight against the growth of fungus. Tobacco extracts having efficacy against whitefly & jassids. Nicotine alkaloids in tobacco smoke, makes an excellent insecticide. Powder of tobacco leaves & dicotyledonous leaves were used to control sucking pests as a botanical pesticide.

And post harvest technologies Seed storage

In storing pulse grain and post-harvest pulse farmers were adopted thirteen indigenous technologies. Majority of the farmers were adopted "Dry the red gram seeds well and store them in gunny bags after placing dried leaves of "Naithulasi" (*Ocimum canum*) inside them to prevent pod borer" with 95.00 per cent, Mixing pulse grams with dried chilies to increase the keeping quality and avoid from storage pests like "brooches" practices with 92.67 per cent, Castor seeds are fried, powdered and mixed with red gram seeds to reduce pest attack during storage indigenous technology with 92.00 per cent, Pulse seeds in earthen pots mixed with wood ash to keep away from storage pests indigenous technology with 85.33 per cent, Red gram seeds are mixed with red earth slurry, dried and stored to avoid storage pests practices with 84.67 per cent, Spread cooked rice in the field bund to attract birds; these birds collect/eat worms in pulse field practice with 81.00 per cent. Vegetable oil and castor oil are mixed with pulses before storage practices with 78.67 per cent, dusting ash along with pulse seeds to control storage pests practice with 74.00 per cent, Neem seed kernel extract is the general organic pesticide used to control many pests in pulses practice with 63.33 per cent and 10 Kgs. pulse seeds mixed with 500 gm. of turmeric powder, 500 ml. groundnut oil for storage for one year practice with 59.33 per cent of adoption.

Overall adoption of ITKs in Pulse cultivation

The overall adoption of Indigenous technologies were calculated and categorized by using mean and standard deviation. The results are presented in the table 24 and fig 15.

Table 2: Overall adoption of ITKs in Pulse cultivation (n=300)

S. No	Adoption	Number	Percentage
1	Low	90	30.00
2	Medium	143	47.66
3	High	67	22.33
Total		300	100.00

From the above table 2 it is concluded that nearly half of the (47.66%) of pulse farmers were medium adopter followed by 30.00 per cent under low level adopter category and 22.33 per cent were high adopters comes under pulse cultivation. The non-availability of organic substances, inadequate knowledge level of farmers about indigenous technologies, non-availability of reference source to clarify the doubts, lack of proper documentation might be the reason for lower percentage of adoption of indigenous technologies.

Conclusion

From the present investigation it is concluded that majority of the pulse growers adopted the indigenous practices like plough intensively than extensively, raising one row of red gram crop with two rows of black gram crop to control pests and disease, October month having conducive climate for boll worms in pulses to avoid this month to escape from boll worm attack and spacing between red gram crops to be increased to control boll worms. Majority of the respondents had medium level of adoption on indigenous technical practices. Since knowledge is the pre-requisite for adoption, it is essential to enhance the knowledge level of pulse growers through proper trainings and demonstrations.

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