Indigenous Technical Knowledge on pulses storage and processing practices in Andhra Pradesh

Article *in* Indian journal of traditional knowledge · June 2006

CITATIONS
11

READS
496

1 author:

Baddigam Sanjeeva Reddy
ICAR - Central Research Institute for Dryland Agriculture, India
29 PUBLICATIONS **101** CITATIONS

SEE PROFILE

Indian Journal of Traditional Knowledge
Vol. 5(1), January 2006, pp. 87-94

Indigenous Technical Knowledge on pulses storage and processing practices in Andhra Pradesh

B Sanjeeva Reddy

Central Research Institute for Dryland Agriculture, Santoshnagar, Hyderabad 500 059, Andhra Pradesh

Received 29 November 2004; revised 21June 2005

Pulses are cheap source of protein supplement to the majority of the Indian population. An attempt has been made in the present study to document Indigenous Technical Knowledge related to practices that are followed in pulses storage and processing in rural areas of Andhra Pradesh. Data was collected from 125 pulses growers and 30 processors with the help of a structured questionnaire. In all, broadly classified 13 Indigenous Technical Knowledge (ITKs) were identified in the study area.

Keywords: Indigenous Technical Knowledge, Traditional storage practices, Pulses storage, Andhra Pradesh

IPC Int. Cl.[7]: A01F25/00

Pulses are among the ancient food crops of India with evidence of their cultivation for over 8,000 years. They form an integral part of the Indian diet and critically supplement cereal based diets[1]. About 15% of the dietary protein is met from pulses in India as compared to 9% in Asia and 7% in the world[2]. In spite of pulses production doubled from 1951 to 2000, the availability has decreased to 38 gm per head per day due to population explosion at faster rate. This alarming situation calls for concerted efforts to increase production of pulses and minimizing their post harvest loss.

Farmers and traditional grain processors have been evolving number of traditional practices through trial and error method, to avoid huge loss that are occurring in stored pulse grains due to insect and pest infestation[3]. Realizing the importance of efficient storage and processing methods in pulse crops production system, methods involving scientific principles were introduced to hasten up the process. These include use of chemicals and fumigation methods in storage, heavy machinery for pulse milling and application of substances like soap stone, waste oil and synthetic colours to impart shining appearance to the end product. These new methods and techniques, which not only require huge power sources at the cost of labour employment but also cause dust pollution in and around the plants and ill effects on the consumer's health. Whereas, traditional methods and practices are more humane in nature, hence blending of traditional and scientific technologies is needed to come up with more environmental and human friendly methods of grain storage and processing practices. Therefore, the immediate concern is to identify and document existing Indigenous Knowledge related to grain storage and processing practices followed in different regions of the country. Keeping this in view, the present study was taken up in Andhra Pradesh.

Methodology

A field survey and data collection work was carried out in the year 2002- 2003. The legume crop growers and pulse processors were contacted either personally or through line department officers. The data were collected from the growers and processors with the help of a structured questionnaire and analyzed using standard statistical tools. Information was received from 125 respondents and 30 rural pulse processors. Further, the authenticity of the information was ascertained by NGO workers and line department personnel.

Results and discussion

The information obtained from the study revealed that the farmers of Andhra Pradesh follow broadly classified six grain storage and seven processing practices in different types of pulses. The practices are enumerated below:

Storage practices

***Drying and packing* (S_1)**

Sun drying is carried out and the dried pulse grains are packed in gunny bags. The activity is repeated more frequently in a season. This is usually done on a full moon day, as this is thought to reduce the risk of damage by pests and diseases. The method is very convenient to follow for any quantity of grain. Little extra efforts are required to shift the bags in and out, and to spread the grain on yard for drying. This method suppresses the internal insect and infestation growth due to periodic drying, but it does not provide protection from external infestation during storage.

***Mixing with other crop grains and packing* (S_2)**

In this practice, pulses are packed tightly in double gunny bags or hard knit gunny bags to reduce the insect movement through weave clearance. Smaller cereal grains are mixed with pulses to fill intergranular space to limit the movement of the insects and also air circulation in the stored grain, which would prevent development and spread of pulse insects and pests. It is easy to follow this practice, if the grains are small in quantity, as no additional cost is involved. If the method is to be adopted for huge quantity of grain, considerable efforts are needed to separate cereals and pulse grain as there are no suitable cleaners and graders are available in rural areas.

***Storage in earthen pot/structure* (S_3)**

This practice involves pouring of pulse grain into the structure and placing a layer of dry sand or cow dung and clay mix at the top to a thickness of 20 cm. The grains to be stored in this practice need to be dried before storage to reduce the moisture content to safe storage level. Even little excess moisture will spoil the grain in this storage practice. The enclosed storage structure provides complete protection to the stored grain from external pest s and insects infestation.

***Mixing of different plant materials with pulse grains* (S_4)**

In this traditional practice of protecting the pulse grains from the storage pests and insects, any one of wood ash, cow dung ash, soap nut leaves, *neem* leaves (Fig. 1) or *pungam* leaves (Fig. 2) are mixed and then stored in bins or bags (Fig. 3,4). The farmers believe that these substances act as insect repellents, antifeedant and oviposition deterrents. This practice protects the grains up to few months from pests and insects. Once the effectiveness of plant materials is lost, the infestation spreads very quickly.

***Oil coating to pulse grains* (S_5)**

In this indigenous storage practice, the pulses are coated with a thin layer of edible oils, *neem* (*Azadirachta indica* A. Juss.) or *karanja* (*Pongamia pinnata* Pierre*)* oils to protect them against insect infestation. There is a complete protection from infestation for a longer period of storage in this method. Coating of edible or non-edible oils to the pulses drastically reduces adult insect emergence and thereby controls the storage loss (Figs. 5-9).

***Heating and packing* (S_6)**

The dried pulse grains are heated by mixing wood ash/cow dung ash/sand and stored in a new earthen pot to suppress the pest infestation growth during storage. The crystalline property of the ash/sand causes mechanical wound to the insect body, as a result, the dehydration takes place and the insect dies. Due to elimination of insects and pests before storage, the practice provides protection to grains for a longer period, i.e. up to one year.

Processing practices

***Soaking and drying* (P_1)**

At the rural processor level, the grains are soaked in fresh water for 8-14 hrs and then dried under bright sunshine for 3-4 days followed by milling. The husk and powdered materials are removed to obtain *dal*. The method is simple, complete dehusking could be obtained in a single pass. Soaking in water helps to loosen the binding action of the gum, possibly by dissolution and leaching[4]. In this method, due to prolonged soaking, the grains swell to a larger extent and on subsequent drying the absorbed moisture is diffused out causing a hollow space between the cotyledons. As a result, cup formation was observed in the resultant *dal*, which is not preferred by urban population. The percentage of broken *dal* is also more in this practice.

***Soaking and mixing with red earth* (P_2)**

In this method the cleaned pulses are soaked in water for 8-10 hrs, red earth is applied and thoroughly mixed with the grains. The mixed grains are sun dried for 4-6 days and is followed by milling. The husk is winnowed off to separate the dal. The binding and abrasive property of the red earth is believed to improve the dehusking of the grains. The method is

Fig. 1 Mixing *Neem* leaves with pulse grains

Fig. 2 Mixing *Pongam* leaves with Pigeon pea

Fig. 3 Storage of pulse grains in gunny bags

Fig. 4 Storage of *Dal* in earthen pot with *Neem* leaves

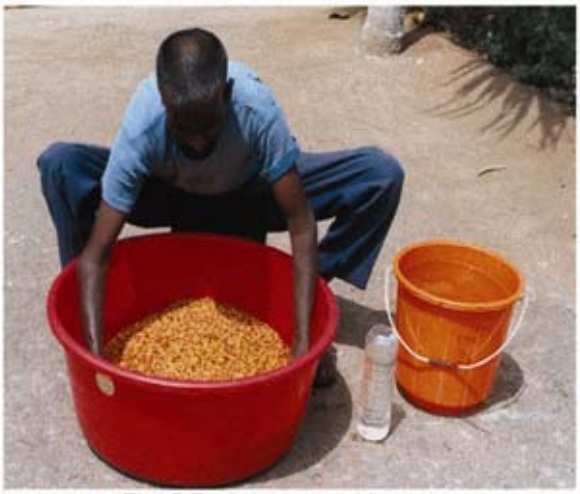

Fig. 5 Pretreatment with water

Fig. 6 Pretreatment with oil

Fig. 7 Sun drying of pretreated Pigeon pea grain

Fig. 8 Pretreated Black gram

Fig. 9 Black gram *Dal*

unhygienic since the grains and red earth are trampled under the human feet to get through mixing of the materials. Even after through cleaning, fine dust remains adhered to the processed *dal*.

***Pitting and wetting* (P_3)**

The grains are passed through the machine at faster rate to scratch the seed coat. The grain thus obtained is thoroughly mixed with edible oil and are sun dried for 2-3 days. The dried grains are milled and husk is separated. In some places, both oil as well as water is thoroughly mixed with the pitted grain. The mixed oil and water penetrates into the grain through cracked husk making the bond between cotyledons loose[5].

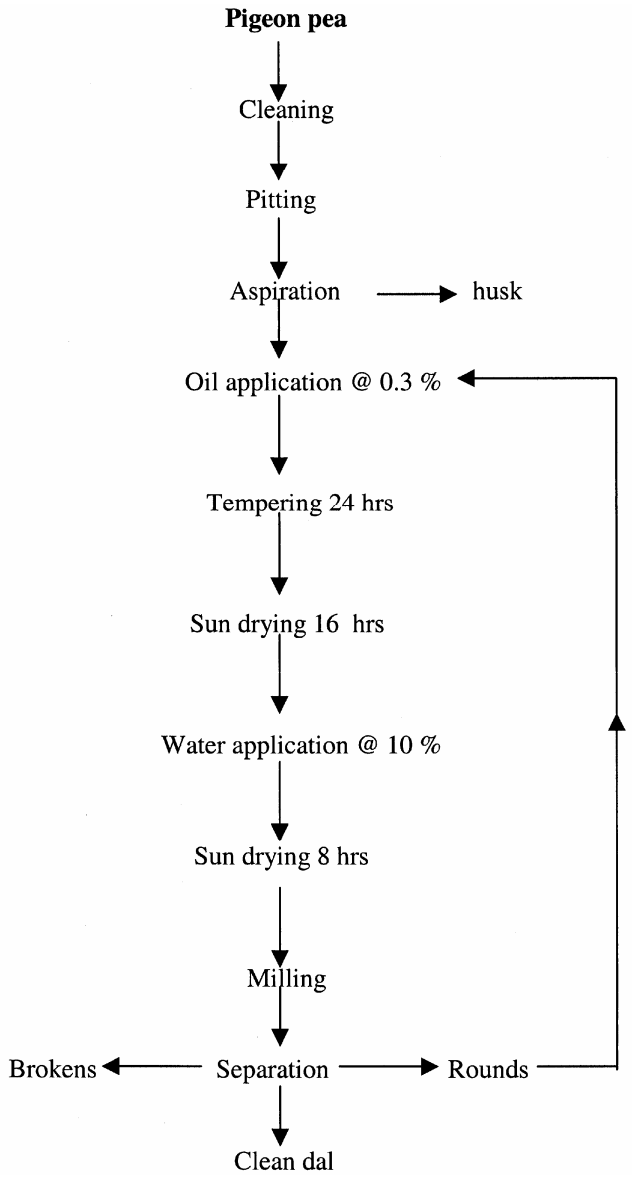

Fig. 10—Pigeon pea milling process flow chart

This practice yields quality *dal* with reasonable recovery up to 75% (Fig. 10). But the treated grain, need to be passed through the machine 2-3 times to obtain complete dehusking.

***Pitting, oil application and roasting* (P_4)**

Dried black gram is passed through the machine to scratch the outer skin. A small quantity of edible oil is thoroughly mixed to the pitted grain and allowed to condition for 2 days. The conditioned grain is roasted for 5-10 minutes in a shallow depth iron pan with sand or ash. The grain thus obtained is milled. The same methodology is also reported for pigeon pea (*Cajanus cajan* Millsp.) processing by some processors. Oil penetrating through the husk into the

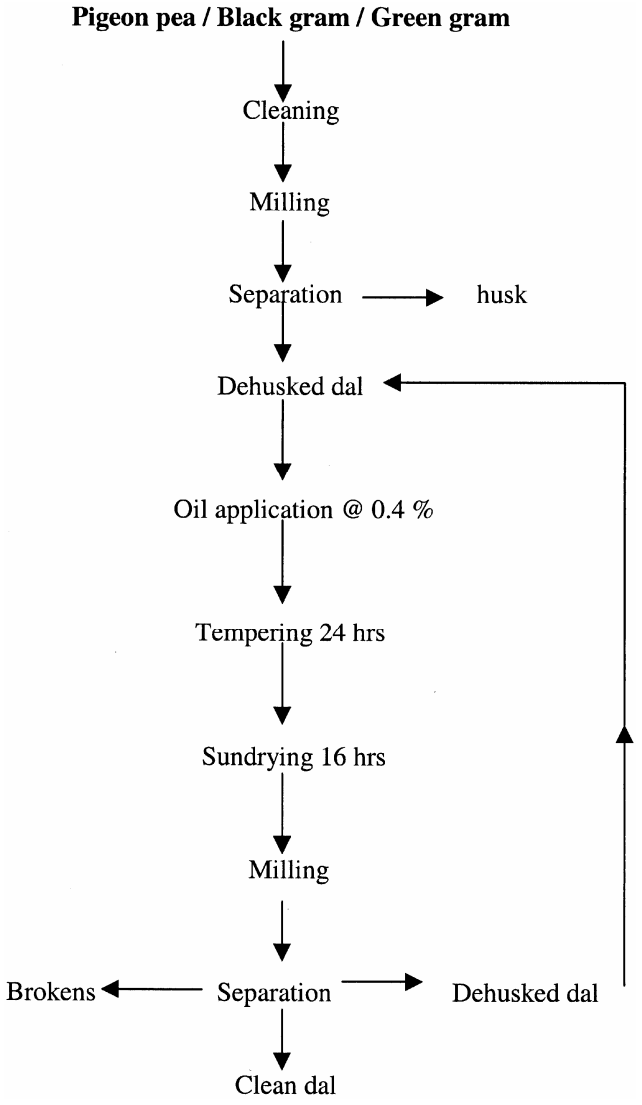

Fig. 11—Pigeon pea/Black gram/Green gram processing flow chart

cotyledon layer releases its binding under the mild heat of roasting[6] .The practice is more cumbersome since it involves lot of human energy in roasting the grain with sand and separating the same.

***Splitting and oil application* (P_5)**

The cleaned and dried black gram (*Vigna mungo* Hepper) and green gram (*Vigna radiata* Wilczek) grains are first milled to obtain unhusked dal. The edible oil is thoroughly mixed with the dal and is sun dried for 2 days. The dried unhusked dal is again passed through the machine or subjected to hand pounding, husk and brokens are separated. In some cases, water mixed with turmeric powder is applied to the cleaned dal to improve esthetic appearance and keeping quality. The method is convenient to follow under farm conditions to obtain dehusked black and green gram dal where efficient pulse processing machinery is not available (Fig. 11).

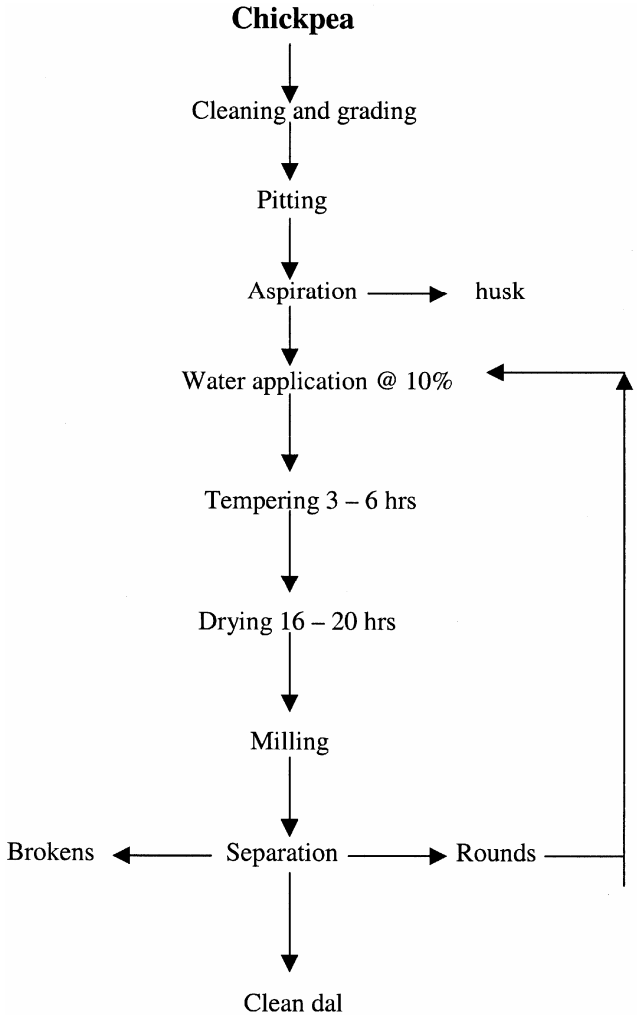

Fig. 12—Chickpea process flow chart

***Scratching, wetting and drying* (P_6)**

The cleaned chickpea (*Cicer arietinum* Linn.) grains are passed through the machine to crack and scratch the outer seed coat. The grains thus obtained are thoroughly mixed with water and allowed to temper for 4-8 hr. The tempered grains are dried under bright sunshine for 16-20 hrs and milled to obtain clean dal (Fig. 12). In this process, the water applied over the grain penetrates into the cotyledons causing minor swelling in the grain structure. Subsequent tempering and drying shrink the cotyledons. As a consequence, the husk tightness over the cotyledons gets reduced and at the same time weakens the bond between cotyledons. Hence, good quality dal could be obtained using the process when compared with soaking and drying process.

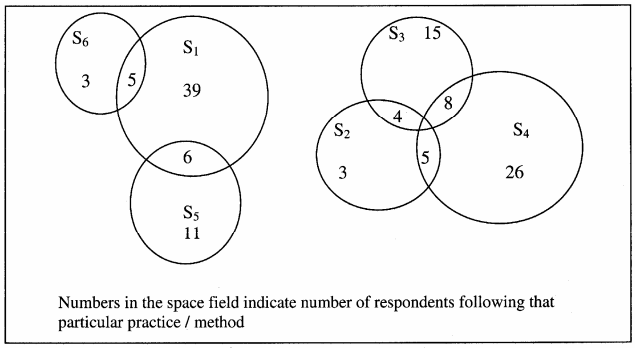

Fig. 13—Set diagram of Traditional storage methods being followed in Andhra Pradesh

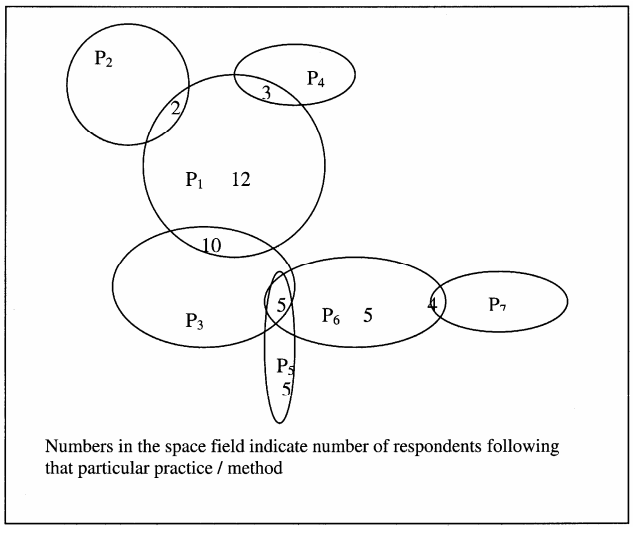

Fig. 14—Set diagram of Traditional pulse processing method being followed in Andhra Pradesh

Table1—*Dal* recovery and *dal* quality in pulse grain processing using Traditional Practices

S. No	Pulse processing practices	Grains for which the practice is being followed	*Dhal* recovery %	*Dal* quality
1	P_1 – Soaking and drying	Pigeon pea	60- 70	Cup formation was observed. Not saleable in the market.
2	P_2 – Soaking Kamya and mixing with red earth	Pigeon pea	60 –70	Cup formation was observed. Not saleable in the market.
3	P_3 – Pitting and wetting	Pigeon pea	70-75	Quality *dal* Saleable product
4	P_4 – Pitting, oil application and roasting	Black gram and green gram	65 - 70	Quality *dal* Saleable product
5	P_5 – Splitting and oil application	Black gram, Green gram and Pigeon pea	70 - 75	Quality *dal* Saleable product
6	P_6 – Scratching, wetting and drying	Chickpea	74 - 80	Quality *dal* Saleable product
7	P_7 – Puffed legumes	Chickpea	90 - 95	Quality puffed chickpea. Saleable product as snack food

***Puffed legumes* (P_7)**

The chickpea grains are first heated gently and moistened with 2-4% fresh/salt water, which is allowed to be absorbed/conditioned over night. The conditioned grains are then roasted with hot sand in a shallow depth, large sized iron pan for 3-5 minutes. The processed grains are cleaned and marketed.

Discussion

The set diagram (Fig. 13) indicates the pulse grain storage practices pattern in the state. It was observed that drying and packing (S_1), mixing of different plant materials with pulse grain (S_4) is two predominantly adopted methods in the study area. The reason being, S_1 is easy to follow for any quantity of grain to be stored, and S_4 is cheapest method to adopt using locally available materials. Nearly, 77 and 22 % of the respondents practicing single and 2 types, respectively of storage methods as per their need, availability of materials and quantity of grain to be stored. It was reported that the traditional knowledge system of pulse grain storage in rural Andhra Pradesh is cost effective and could be followed using locally available materials.

The pulse grain processing practices suggest that (Fig. 14) soaking and drying (P_1) are still single most widely followed pulses processing method in the rural areas of Andhra Pradesh. The processors opined that the method is amenable to various types of home scale machinery such as Flour *chakki*, Roller type mini dal mill including Stone *chakki*. However, the dal obtained using this practice is inferior in quality due to cup formation. Hence, the product is not salable in the market. The reported dal recovery was also low (60-70%) when compared with other methods (Table 1). Among the 30 respondents, nearly 50% were following improved pulse processing (P_3, P_6 and P_5) methods (Fig. 10-12) to obtain salable market quality dal depending on the market demand. The dal recovery obtained in this practices using small capacity mini dal mill (150-200 kg) is comparable to that of commercial mills (nearly 75%).

Conclusion

A good number of indigenous pulses storage and processing methods were found to exist in Andhra Pradesh. Using some of these storage practices, the grain could be stored up to 6-12 months with out any pest infestation. Dal obtained from some of the indigenous processing techniques was found to be as good as that of dal obtained from commercial mill. Hence, these practices need to be documented, validated and popularized effectively to generate employment and income in rural areas. Not only that, through wide scale adoption of such practices under on-farm, the grain loss that are occurring during handling, transportation and processing could be minimized to a considerable extent.

Acknowledgment

The financial assistance from the NATP under Rain fed Pulses Production System (Project code: RPPS-4) is thankfully acknowledged. The author also wishes to express his sincere gratitude to the pulse crop growers and processors for revealing the information.

References

1 Project Report on *Upgradation and Evaluation of mini dal mills*, (CRIDA, Hyderabad), 2003.

2 Shiv Kumar and Masood Ali, Pulses: An essential ingredient of food basket, *Indian Farming*, 51(8) (2001), 43

3 Pushpamma P and Rao K C, Pigeon pea Production, Processing and Utilizaton in Andhra Pradesh, in: *Proceedings of the International Workshop on Pigeon peas*, (ICRISAT, Patancheru, Andhra Pradesh), 2 (1980), 435 – 441.

4 Saxena R P, Milling of pigeon pea grains and associated aspects, Ph.D Thesis, (G B Pant University of Agriculture and Technology, Pantnagar, Uttar Pradesh), 1985.

5 Singh U and Jambunathan R, Pigeon pea: Post harvest technology, in: *The Pigeon pea*, ed. Y L Nene, Susan D Hall and V K Sheila, (ICRISAT, Patancheru, Andhra Pradesh), 1990,435 – 455.

6 Reddy V P R, *Dehusking of Arhar grain*, M Tech Thesis, (G B Pant University of Agriculture and Technology, Pantnagar, Uttar Pradesh), 1981.