



APPENDIX 11

Report On

**Aflatoxins Participatory Management of Groundnut Thresher for
Early Pod Separation to Control**

- A Case Study of 2003 – 2004 Threshing Season in Anantapur District.

Of the project on
Aflatoxin Contamination In Groundnut In Southern India;
Raising Awareness And Transferring
And Disseminating Technologies To Reduce Aflatoxin

(Project No. **ZA0570 - R 8298**)

For the
International Crops Research institute for the Semi-Arid Tropics (ICRISAT)
and
Natural Resource International, UK.

Prepared by
Rama Devi Kolli
And
T. Harischandra Prasad



SOCIETY FOR TRANSFORMATION,

AGRICULTURE AND ALTERNATIVES IN DEVELOPMENT

Aflatoxins Participatory Management of Groundnut Thresher for Early Pod Separation to Control

- A Case Study of 2003 – 2004 Threshing Season in Anantapur District.

1. The Background

Farmers in Anantapur district were encouraged to use mechanical threshers to facilitate early separation of groundnut pods from the plants (threshing operation) as one of the post-harvest technology interventions for reducing aflatoxin contamination in groundnuts. The main rationale behind this intervention (undertaken during the current threshing season, Dec 03 - Feb 04) was to encourage farmers to undertake pod stripping immediately after the primary field drying.

This intervention was planned as against the farmers' current practice of stacking up the crop after the primary field drying and taking up the threshing operation at a convenient time later on. This stacking of crop (haulm & pods together) is believed to be a possible cause for increasing the chances of aflatoxin contamination. This may be especially true if the pods are not properly dried during the primary field drying process, leading to moisture build up (in the stack) which is conducive to the growth and spread of aflatoxin. It is also expected that if threshers are made available to the farmers in sufficient numbers, they will be able to save substantially on labor costs and time and have a clean crop on hand that may fetch higher prices.

1.1. Why stacking

Farmers of Anantapur stack the groundnut crop in their backyards or at threshing grounds immediately after field drying and undertake pod separation at a later date mainly for two reasons

- a) As a means of avoiding the high labour charges that prevail during the harvest season (demand for labor during the very short harvesting season is high and time is limited due to non availability of sufficient soil moisture for extended periods), and
- b) The belief that stacking the plants with the pods attached allows the pods draw nutrients from plant during the stacking period and thereby helps improve kernel size and yields (outturn).

Even in areas where mechanical threshing for pod separation is an established process, farmers nevertheless are apt to stack their produce awaiting access to threshers. Availability of threshers during the peak harvesting season is a big limiting factor (Phase I – PRA reports).

1.2. Intervention Process

Reducing the levels of aflatoxin contamination in groundnuts being the main aim of the study, project partners had proposed to provide mechanical threshing facility to the farmers of the study villages at subsidized costs, thereby encouraging farmers into early pod stripping. The activity was to ensure that prolonged stacking of the groundnut crop is avoided. Threshers were to be made accessible to all the interested farmers of the village – irrespective of their gender and/or social/wealth group.

It was decided to provide mechanical threshers to the farmers in one or two villages of Anantapur district initially and preferably in those villages where threshing is done manually and under conditions of prolonged stacking. It was further decided that the threshers would be introduced,

during the current season itself, through a participatory approach and only after farmers confirmed their willingness to experiment with early pod stripping.

2. Selection of village(s) and farmers groups

Mechanical threshing is catching up fast in Anantapur and hence farmers in this region are not complete strangers to mechanical threshers. Yet, threshers being expensive at Rs. 60,000 per unit, it is prohibitive for farmers to own them on an individual basis. Enterprising farmers and investors who own such threshers undertake the threshing operations by collecting fixed charges per bag of pods stripped (excluding labour, water and one way transport costs) irrespective of the yields.

This year, due to the severe drought conditions in general and due to mid-season drought stress for groundnut crop, the crop had nearly dried up or the yields were too low, in Anantapur. Thresher owners had consequently found that it was not profitable to charge at the 'per bag of pods' rate. They started hiring out their units on a daily rental basis irrespective of the yield potential of the crop. Cost of diesel and labor were to be borne by the farmer as consumed. Farmers in most of the villages were obviously reluctant to opt for the new arrangement, as it would be uneconomical to use mechanical threshers at the offered rates and so decided to thresh groundnuts manually as the harvested quantities were anyway too small.

However, supply of the ANGRAU thresher free of cost had attracted the farmers at West Narsapur village, who decided to undertake the experiment. Though mechanical threshing is common in this village (three of the farmers own such threshers), saving the hire charges of about Rs. 300/- per day was attractive enough to the farmers and so were willing to bear the required expenditure for diesel and labour. Therefore, it was decided to initiate the process at West Narsapur village during the current threshing season by introducing one thresher.

Farmers of this village were already familiar with the PVS process, as three farmers from this village had carried out on-farm trials with the 14 new aflatoxin resistant groundnut varieties. Though mechanical threshers were available to the farmers, undertaking early pod stripping with the threshers was not considered so far as a post harvest technology for reducing aflatoxin contamination in groundnuts. Similarly, farmers did not consider access to threshers as a cost saving measure or a technology related issue earlier as stacking had become a part of their normal harvesting practice.

West Narsapur is a village in Singanamala mandal of Anantapur district and is located about 15 km. away from the Hyderabad – Bangalore highway and about 35kms from Anantapur - the district headquarters. There are nine self-help groups in the village, out of which five are women's DW CRA groups (under the govt. of India's thrift group program) and four 'Ryotu Mitra' (farmers clubs - male) groups.

3. Participatory approach

With ANGRAU agreeing to provide one of their threshers free of cost, it was felt that the farmers would save on some of the charges. However, the entire process of handling the machines and organizing the activity of rotating the machine among the farmers based on their perceived demands was to be entrusted to the farmers as a group responsibility.

STAAD, RDT/Accion Fraterna (Rural Development Trust / AF, a local NGO involved with watersheds and other development activities in the village and a partner in the PVS process) and ANGRAU participating on behalf of the aflatoxin project partners carried out negotiations with

representatives of nine farmer self-help groups of West Narsapur village and decided on the terms of providing the thresher to the farmers. Farmer representatives included members of the men and women farmer groups, the watershed groups and the village development groups. (Details of the terms of agreement were presented in an earlier report).

Some of the important terms agreed to and relevant to the report are that

- A Thresher Organization Committee is to be formed in a participatory manner wherein gender participation, special skills and other responsibilities of the members were considered
- The roles of the different members were discussed and agreed upon and accordingly, the responsibilities of different members of the committee as well as RDT/AF were also decided.
- ANGRAU was to dispatch the thresher to the village at its cost and the villagers would return it to their office at their cost.
- No hire charges would be levied
- An amount of Rs. 150/- would be collected from the farmers per days hire as deposit for expenses to be incurred towards operator cost, minor repairs and other incidentals.
- The entire responsibility of handling the machines and organizing the activity of rotating the machine among the farmers was to be entrusted to this committee.

3.1. The process of handing over thresher

As decided, the thresher was to be handed over to the farmers as a group responsibility. The process of handing over the thresher based on the terms of agreement reached between the farmer groups and the project partners (STAAD, ANGRAU and RDT/ AF) was initiated by explaining the modalities of physical transfer of the thresher to the village, the technical aspects of the equipment, the rentals, value of repair costs to be borne by the farmers and the group, and the subsequent monitoring aspects. Consequently, the thresher was moved to the village by ANGRAU at its cost and handed over to the Thresher Organization Committee.

Certain exceptions to the agreements had to be made before the farmers could freely use the thresher. As a result, ANGRAU staff had to visit the village four times during the operation to monitor the process and to attend to some technical problems related to the thresher. Due to failure of the injector excessive consumption of fuel and breakage of pods due to wrong positioning of the thresher blades that needed adjustments were attended to and got rectified by ANGRAU staffers.

Again, while the thresher had to be transported back to ANGRAU by the thresher organization committee, due to an attachment hook problem ANGRAU had to bring its tractor and transport the machine back to its premises at its own cost. These return transportation charges were exempted for this year, by ANGRAU but the Committee was informed that it would not be possible next year.

3.2. The impact of participatory management of thresher

At the end of the threshing season, STAAD research team, in liaison with the threshing committee, ANGRAU and RDT/Accion Fraterna carried out an evaluation to assess -

- whether, providing access to threshers serves the main purpose of encouraging farmers into undertaking early pod separation,
- accessibility of threshers to the poor and women farmers
- the impact of providing the thresher on farmers livelihoods.

3.3. Thresher allocation and operation

Issues such as establishing order of allocation among farmers for hiring thresher had cropped up before the thresher could be operationalized. The thresher committee came up with solutions to such problems effectively. For example, it developed a lottery method for sequencing thresher rotation. The farmers were asked to draw chits with numbers, to decide their order of allotment. RDT/Accion Fraterna's Socio-technical officer (STO) based at West Narasapur village facilitated the entire process of thresher use by regularly interacting with the Thresher Committee by attending meetings and writing down the minutes of these meetings besides helping the Committee in managing the funds. Some of the important issues pertaining to the functioning of the thresher organization committee are as follows:

- The thresher organization committee had effectively managed to take care of the thresher, its rotation among farmers, its economics of operation and its repair and maintenance.
- The order of rotation of the thresher was decided by the committee depending on the urgency of the need of the individual farmer.
- An advance of Rs 150/- per day was collected from each farmer to thresh the produce, irrespective of the quantity from 6.00 A.M to 6.00 P.M. However, if threshing of crop required extra time to the extent of one or two hours, the farmer was not charged any extra amount.
- Twenty-three (23) farmers utilized the thresher during the season, out of which only five were poor farmers.
- It was mostly the richer farmers who could pay the advance that utilized it.

Realizing the fact that poor farmers (≤ 3 acres) were not in a position to

- pay the rent advance due to financial problems, and
- wait for their turn for threshing their produce as they have small spaces in their backyards, (they need the space for various other tasks),

the committee had given them priority in allocating the machine and also gave them the opportunity to pay the day rents after threshing and selling the produce.

4. Economics of thresher operation

An analysis of the utilization and the costs and returns in using the subsidized thresher shows that not only were the farmers benefited, a surplus was also reported at the end of the operation.

The thresher worked for a total of 23 working days (day and night included). The total advance collected was Rs. 3,600/-. While the total expenditure incurred was Rs. 1595.00, 72% of it (at Rs. 50/- per day X 23 days = Rs. 1,150/-) was spent on employing an operator. Maintenance, repairs, consumables, etc., accounted for the rest. It was decided that the net surplus amount of Rs. 2005/- be allocated to the village development fund (VDF) for future development activities. All the village institutions are represented in VDC (Village Development Committee) that controls the VDF.

The farmer on the other hand had to spend about Rs. 800/- per day towards the total costs of hiring the thresher for one day. The expenditure pattern is as follows:

- Rs.150/- towards days charges.
- The thresher required eight labourers, of which six were men and two were women who were paid per day wages of Rs. 50/ and Rs. 30/ each respectively amounting to Rs 360/-.

- The thresher consumes 6-7 litres of diesel per day for threshing (a little more if the haulms contains more moisture) which costs the farmers about Rs. 150/- per day
- Transport of machine to threshing spot and supply of water costs approximately Rs.150/- (about 200 litres of water is required to be transported to the threshing site for use as engine coolant during threshing operation).

Threshers have a capacity to separate up to 80 to 100 bags of clean pods per day (12 hours – 6 am to 6 pm) given normal / average yields in the region, and thresher owners were normally charging Rs.20/ per bag of pods threshed in addition to the labor, water and machine transport costs. The total charges incurred by a farmers averaged to about Rs.2100/- per days work, yielding about 80 bags. Cost per bag works out to Rs. 26/-. Thresher owners were getting up to Rs. 1600/-, and after deducting diesel, operator wages, and incidentals which work out to about Rs. 300/-, the net profits were about Rs. 1300/- per day.

Crop failure due to drought and the low yields and, (just about 40 to 50 bags of pods were being threshed per day) had resulted in fewer work opportunities for the small farmers leading to a drop in demand for threshers. Seeing no profits in operating the machines, thresher owners started hiring the machines at Rs. 300/- per day. All the operating costs including diesel, operator wages, labor, water and machine transport costs were to be borne by the hirer. With the free supply of thresher by ANGRAU, farmers had saved more than Rs.300/ per day of threshing with the costs worked out to just about Rs. 20/- per bag of pods. Given normal yields and free supply of thresher, farmer costs would come down to less than Rs.10/- per bag of pods.

While the possibilities of owning community threshers looks positive given the above economics, the committee however expressed that it would be uneconomical to buy or even hire a thresher in the market by farmers themselves. Even though loans could be made available from banks, repaying interest and principle ranging between Rs.8000/- to Rs.10,000/- per year would be difficult as the working days of the thresher are very limited to the threshing season.

However farmers were very keen to continue mechanical threshing if capital costs are met by some support agency. The SHGs or the Village Development Committee at this point cannot organize to invest in purchasing a thresher as farmers already had many pending debts to clear up due to repeated crop failures and drought conditions in the area.

5. Farmer Reactions - The Major Findings of the Study

After observing the costs and benefits involved in using the subsidized threshers, farmers realized that manual stripping is more expensive than mechanical threshing even during conditions of very low yields. The other benefits derived by the farmers from the use of the thresher as expressed by some of them are that

- They realized that manual threshing was time consuming, laborious and cumbersome.
- The machine threshed produce was cleaner and fetched higher price (up to Rs. 45/- more per bag of pods) compared to manually separated pods.
- Manually separated pods are likely to contain small and immature pods, husk and other foreign matter that adversely affect pricing at the market.
- Mechanical threshing also cleans up a lot of ill filled pods and refraction thereby increasing shelling percentages and consequently the pricing.

Farmers had also stated that

- Many more farm households could have used this opportunity of low cost mechanical threshing, but most farmers had to opt for manual threshing since the groundnut yields this year were so low that even subsidized threshing turned out to be expensive.
- Most of the farmers had already completed pod separation activity by the time decisions for supply of the thresher was taken and the thresher actually reached the village.
- They had also considered the fact that whatever little fodder would be available to them this year had to be preserved carefully and quality maintained. Groundnut haulm is chopped to pieces (usually damaged) during mechanical threshing.
- Only one woman farmer was among the beneficiaries in utilizing the thresher. Other women headed households finished stripping the pods manually due to less out turn with the help of their family members by the time thresher arrived, as there was less work due to the bad season.

6. Intervention of thresher for early pod separation and aflatoxin control

6.1. Thresher availability and Early Pod Separation

Discussions with farmers and the Thresher Committee revealed the following aspects of access to and utilization of mechanical threshers as a tool for undertaking early pod separation of groundnut. Farmers – both men and women - had expressed that

- Access to threshers certainly encourages them to take up early pod separation
- It can help them prevent stacking groundnut produce for longer periods which affects the quality of crop.
- Poor farmers felt that access to the thresher would further benefit them since,
 - They can save on the operation costs of an entire activity of stacking and protecting the crop during the stacking period
 - Stacking the produce in their courtyards (prevailing practice in this village) poses space problem (a major hurdle) and affects other tasks that they have to perform in and around their houses.
 - They can quickly attend to their other employment opportunities available during the post harvest period without worrying about taking care of their produce and avoid potential conflicts on their time.

It was however not possible to ensure that the thresher was used for pod separation directly in field or at the threshing floors immediately after the field drying process as the thresher had reached the village at the end of the harvesting period. Most of the farmers had used the facility to separate the pods much earlier than they usually would have done without the thresher, thereby considerably reducing the stacking period.

It was also not possible to ascertain whether

- farmers would be able to undertake pod separation activity immediately after initial field drying or will like to stack the crop for a brief period to ‘allow for completing of pod filling’
- if yes, whether the activity could be undertaken
 - a) at the field, or
 - b) at the threshing floor immediately after transportation, and
- whether it would be possible for the farmers to undertake the activity even if they would ideally like to do so, keeping in view the shortages in labour supply and especially during a good crop season.

It will be essential to position the thresher well before the commencement of the harvest season if the farmers were to organize the sequencing and rotation of the thresher among themselves and derive the full benefits of the crop management / post harvest technique of early pod separation, help reduce aflatoxin contamination and consequently obtain higher market prices for their crop as well as reduce exposure to health risks.

6.2. Access to Mechanical Thresher

The present case study shows that the proportion of poor farmers among the thresher users was quite less (five out of twenty three farmers) due to reasons such as

- Low yields due to drought - thereby rendering mechanical threshing uneconomical.
- Late arrival of thresher - by the time the thresher arrived, most farmers had to complete threshing their crop and rush to take up other livelihood opportunities.
- Women headed households where women depend on the male relatives for the sale of their produce had to complete the threshing as quickly as possible and keep the stock ready for sale at the earliest.
- Some of them could not afford to pay even the subsidized hire charges.

Though the Thresher Committee did try to neutralize these problems of the poor farmers to a certain extent by measures such as giving preferential allotment and delaying the rent collection, it may take quite some time before early mechanical threshing of ground crop is accepted as a normal practice. It is therefore felt that, apart from making the thresher available very early in the season, in addition to the above measures other features such as differential hiring charges and free transport may be provided to make the thresher more accessible to the poor during the subsequent phases of the project.

6.3. Affordability of Mechanical Threshers

Farmers look at the mechanical thresher as an expensive asset. They do appreciate its usefulness in speeding up the threshing process and as a bonus also benefit from the extra profit they can make in the market by selling mechanically threshed groundnuts. Yet, they expressed that they cannot afford to own it even at a community level, as they are not confident about pooling their resources to buy one.

The only stumbling block would be the interest on the capital cost of the machinery that is prohibitive for the farmers. It is seen that in just 23 days working, and at highly reduced tariffs farmers could save up to 40% of the rents collected. With a 60 day working period, a good season, use in summer crop threshing (20 days) and increase in rentals to Rs.200/- per day farmers should be able to save sufficiently to repay the cost of the thresher within 5 years and there after use it for free. However, interest component on the capital costs need to be subsidized completely.

- Some farmers had expressed the need to consider some of the negative factors of using mechanical threshers for pod stripping of the groundnut crop such as
- Damage to and quality loss of fodder –
 - Farmers were of the opinion that the output of fodder would be less from mechanical threshing as compared to manual stripping.
 - Mud from the roots of the plants get powdered and mixed up with the crop residue leading to stomach problems in cattle
 - The plants get chopped to pieces that reduce fodder quality. Animals do not like it so.
 - Broken and ill-filled pods blown away by the thresher cannot be retrieved from the fodder and are likely to affect fodder quality.

- Reduction in the quantity of produce –
 - Small and ill-filled pods blown away by the thresher are not retrievable and so not available to the farmer leading to loss of produce.

It also remains to be seen whether farmers do / will undertake pod separation immediately after field drying even if threshers are available in sufficient numbers at cheaply, keeping in view their current practices and perceptions as well as the pattern of labour availability.

7. Conclusions

Is the Mechanical Thresher a solution to early pod separation and aflatoxin control?

A beginning was made to set in motion the process of early pod stripping as effective means to contain the spread of aflatoxin contamination in groundnuts. A new perspective to the use of mechanical threshers as a tool of improved management practice was provided through this study.

It is clear from this study that farmers are definitely interested in using mechanical threshers if the economics are not adverse to their present situation. Farmers at this point approved the use of thresher if it is available to them as an alternative to prolonged stacking as they can be saved from the ordeal of stacking the produce till they get an opportunity to separate the pods. Moreover, farmers do know that mechanically threshed groundnut pods fetch a better price in the market as compared to the manually threshed ones. Farmers were of the opinion that with a good crop use of the thresher would be more beneficial.

The urgent need now is to prove that early pod separation as compared to prolonged stacking of the produce does help in containing aflatoxin contamination of groundnuts. Similarly we also need to prove or disprove whether stacking would help to increase the ‘outturn’ or not, a widely held perception of the farmers (ANGRAU had agreed to clarify this soon). A clear perception on the ‘outturn’ aspect would go a long way to convince the farmers that early pod stripping indeed would be rewarding in several ways.

Do coalitions help?

The process of social organization that was required to allocate the thresher to the farming community as a whole helped us to understand the scope and need for sharing and community participation as a prerequisite to facilitate the process of technical change. Through this process several technical and non-technical issues and potential conflicts related to ‘access’ and payments for user charges etc. were also resolved to the best advantage of all concerned.

It was also realized that farmers do require good facilitators like RDT/Accion Fraterna in the initial stages which helps the farmers organize themselves and negotiate the terms of operationalizing and institutionalizing thresher use and hiring procedures amicably. Local technical support as provided by ANGRAU gives confidence to the farming community in understanding and operating the machines. From the project perspective, good coordination and cooperation among project partners certainly contributed to setting up the process in motion and brought it to its logical conclusion.

8. Recommendations

In order to ensure that farmers will accept the practice of early pod separation as a post-harvest technology for reducing aflatoxin contamination in groundnuts, two aspects need to be clarified to them explicitly. One – the effect of stacking– does it help in increasing ‘outturn’ as claimed by

farmers or is it a myth believed by farmers; and two - that early pod separation does reduce aflatoxin contamination.

It is essential to continue and if possible upscale the accessibility of threshers, by positioning the thresher well before the commencement of the next harvest season, for obtaining conclusive evidence on the possibility of popularizing early pod separation immediately after initial field drying, as an important crop-management / post-harvest technique for reducing aflatoxin contamination, realizing higher market prices for the crop and reducing exposure to health risks,.

It is also important to improve accessibility of the threshers to poor and women farmers and at subsidized costs through negotiations within the community and introducing differential hiring rates or offering thresher for smaller fractions of time.

In order to continue this activity with the farmers next year, we need to convince them with conclusive evidence on the extent of aflatoxin content in groundnuts with and without stacking and the impact of early pod separation on the extent and spread of aflatoxin contamination.