Knowledge and adoption of aflatoxin management practices in groundnut farming in Junagadh, Gujarat, India

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Groundnut (Arachis hypogaea) is the most important oilseed crop in Gujarat, India, and occupies an area of 1.9 million ha with a production of 1.5 million t. Eighty per cent of groundnut production is utilized for oil extraction and 10% is used for direct human consumption in the state. There is a great potential for direct consumption of groundnut and groundnut-based products due to its high nutritive value as it is eminently suitable for ‘cheap fast food’ both in the natural state and after processing. The major challenge to diversify groundnut from oil extraction to food purpose is the aflatoxin contamination. Aflatoxins are the toxic substances produced by toxigenic strains of fungi, Aspergillus flavus and A. parasiticus. Groundnut can be contaminated with aflatoxin at various stages before harvest, during field drying, curing and in storage (Freeman et al. 1999).

Groundnut is a major crop of Junagadh district, Gujarat, grown mostly under rainfed conditions in an area of 0.37 million ha and production of 0.39 million t, with an average yield of 1024 kg ha⁻¹ (Sahu and Patoliya 2005). The major portion of the produce is used for oil extraction and a small portion is used for consumption by the family. A wide range of groundnut confectionary products is utilized in the daily diets of people of the district. There is every chance that people may consume the contaminated produce, as there are no quality checks in domestic trade and groundnuts meant for local consumption. Hence, it becomes more important to check the aflatoxin contamination in groundnuts meant for local consumption.

Several national and international institutes including International Crops Research Institute for the Semi-Aрид Tropics (ICRISAT) have carried out research on aflatoxin contamination, and developed technologies, which can significantly reduce contamination, but these technologies were not adopted by farmers due to lack of awareness. Hence, the present study was conducted during 2005–06 rainy season to document the level of knowledge and extent of adoption of aflatoxin management practices of groundnut (AMPG) and constraints faced by farmers in adoption of AMPG.

Materials and methods

To measure the knowledge and adoption of AMPG, teacher-made scales were developed. The scales consisted of statements pertaining to pre-sowing, sowing, post-sowing, harvest and postharvest practices of aflatoxin management. The relevancy of statements of the scales was ascertained by thirty experts from Junagadh Agricultural University (JAU), National Research Centre for Groundnut (NRCG) and Gujarat State Agriculture Department. Final knowledge test consisted of thirty-two statements and adoption scale consisted of twenty-two statements. One hundred and eighty farmers were selected for the study by employing multi-stage random sampling technique. Twenty respondents each were selected from 9 villages, viz, Vadhavi, Vadal, Chokli, Agatrai, Ajab, Bamnasa, Nandharki, Umatwada and Koyli of 3 talukas of Junagadh district. The data were collected with the help of pre-tested schedule by personal interview of farmers. The responses were recorded as correct/incorrect or yes/no against each statement. A unit score was given to correct/yes answer, and zero to incorrect/no answer. The total score obtained by the respondent for all the statements was summed up, which gave the individual respondent’s score.

Results and discussion

Level of knowledge and extent of adoption of AMPG

The mean knowledge and adoption scores of the respondents were 11.5 and 10.2, respectively (Table 1). These scores were low compared to the maximum possible scores of 32 and 22 for knowledge and adoption, respectively. This indicates that the farmers had low knowledge and low adoption of AMPG. Based on the mean scores and their standard deviation, the respondents were grouped into three categories, low, medium and high with respect to knowledge and adoption. About 67.8% of farmers were in medium category with regard to
knowledge of AMPG, followed by 19.4% and 12.8% in high and low categories, respectively; 68.3% of respondents were in medium category with regard to adoption followed by 16.7% and 15% in high and low categories, respectively.

**Pre-sowing aflatoxin management.** Most of the farmers did not possess knowledge on soil management practices like deep plowing and application of castor/neem cakes, but 81% of sampled farmers had knowledge on manual weed control and 87% adopted the same.

**Sowing and post-sowing aflatoxin management.** Sixty-seven per cent of farmers had knowledge about early maturing varieties, 69% on chemical seed treatment and 65% on plant protection measures, and these practices were adopted by almost same percentage of farmers. Only 27% of farmers had knowledge on seed treatment with biocontrol agents like *Trichoderma viride* and *T. harzianum* and 17% farmers adopted them. Twenty-eight per cent of farmers had knowledge on the benefits of gypsum application and 15% on supplemental irrigation and adopted the same.

**Harvest and postharvest aflatoxin management.** Twenty-nine per cent of farmers had knowledge on the importance of harvesting at right maturity but 86% of farmers harvested the crop at optimum maturity. Seventy-four per cent of respondents had knowledge on the identification of well dried pods and adopted the same. Most of the farmers did not possess knowledge on prevention of damage to pods during harvesting, avoiding mixing of healthy and immature pods, precautions to be taken during storage of pods, and importance of fumigation and did not adopt these practices. Majority of farmers did not possess knowledge on pre-sowing, harvest and postharvest aflatoxin management practices, which are very critical for control of aflatoxin contamination of groundnut.

**Constraints in adoption of AMPG**

The most important constraint for adoption of AMPG, expressed by 90.6% of farmers was lack of premium price for aflatoxin free groundnuts, followed by lack of awareness on ill effects of consumption of aflatoxin contaminated groundnuts (89.4%), non-availability of sufficient quantity of quality seed for sowing (87.8%), lack of awareness on aflatoxin contamination (86.1%), inadequate knowledge on the use of biological control methods (83.9%), delay/irregularity of rains affecting time of sowing (82.8%), inability of farmers to identify aflatoxin contamination (76.7%), lack of knowledge on grading (75.6%), inadequate knowledge on proper drying and stacking of plants, lack of knowledge on fumigation (56.1%), lack of efficient storage facilities (54.4%) and non-availability of timely credit affecting timely performing of various operations (47.2%).

Farmers felt that the market has neither rejected contaminated produce nor provided incentives to contamination free groundnuts. There was no hindrance for the sale of contaminated groundnut in the local markets, as there was no resistance from the ultimate consumers of groundnut.

**Conclusion**

Mass awareness campaigns are required to educate farmers and consumers on the ill effects of aflatoxin contamination. Providing incentives/premium price and building of consumer demands for aflatoxin free groundnuts and imparting training to farmers on identification of aflatoxin contamination will go a long way in reducing the aflatoxin contamination of groundnut.

**References**
