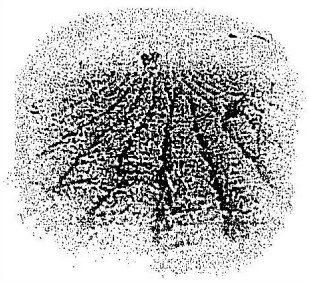
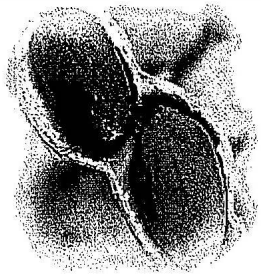
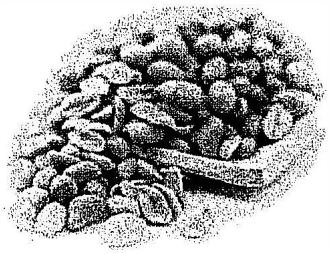
SUMMARY
International Peanut Conference 2005

Prospects and Emerging Opportunities for Peanut Quality and Utilization Technology

January 9 – 12, 2005
Kasetsart University, Bangkok, Thailand

Organized by:
Kasetsart University
USAID Peanut CRSP
University of Georgia
Khon Kaen University
The Department of Agriculture
The Department of Agricultural Extension

Selection for Groundnut Varieties with Low Aflatoxin Risk under Terminal Moisture Stress

P.V. Reddy, P. Sudhakar, P.H. Naidu, S.N. Nigam, F. Waliyar, R.C. Nageswara Rao and G.C. Wright
Regional Agricultural Research Station, Tirupati 517 502, A.P., India

Introduction

Aflatoxin contamination seriously affects the edible quality of groundnuts and its products rendering them unfit for human and livestock consumption. Various surveys conducted in different parts of India have shown high aflatoxin levels in groundnut food products (Gewande,1997). Terminal droughts are often a predisposing factor for aflatoxin contamination in groundnut. In the present study the genotypic variation in aflatoxin contamination under terminal moisture stress is examined.

Materials and methods

Twenty groundnut genotypes were screened under field conditions for aflatoxin contamination during 2000 rainy,2002/03 postrainyand 2003 rainy seasons at Regional Agricultural Research Station , Tirupati, India. The genotypes screened included lines with known tolerance to aflatoxin
pests and terminal drought. A severe strain of *Aspergillus flavus* was isolated by collecting native strains from different parts of Chittoor district in Andhra Pradesh State of South India. A sick plot was developed utilizing this strain. *A. flavus* inoculum was applied at the rate of 2.5 g per meter row length at 40 and 60 days after sowing (DAS). Terminal moisture stress was imposed utilizing rain out shelters in rainy season (July-November) and by skipping irrigations in the postrainy season (December-April) season from 70 DAS to harvest. Relative water content of leaf, leaf temperatures, pod and kernel moisture content and water activity, pod wall integrity at harvest were some of the plant water status parameters measured. Substrate composition of kernels in terms of per cent oil, fatty acid composition, total sugars, total soluble proteins and total phenols were recorded at harvest. Seed colonization and aflatoxin content of the genotypes tested were estimated at harvest.

Results and discussion

Plant moisture status in terms of leaf relative water content, kernel and pod moisture percent. kernel water activity at harvest, mean soil temperatures during terminal stress and the resultant mean aflatoxin content differed in 2002 rainy and 2002/03 post- rainy seasons, indicating that moisture stress levels achieved during the 2002/03 post-rainy season were more optimal for screening groundnut genotypes. Cole et al. (1993) reported that under prolonged drought conditions groundnut genotypes that maintained high kernel moisture showed enhanced resistance and produced low aflatoxin. However, the relationship between the plant water status and aflatoxin production in the present study was weak and non-significant.

Among the genotypes screened, J11, IC48, ICGV 89104, ICGS76 and CSMG84-1 had low aflatoxin levels compared to ICGV 86158,93291,93280,99029 and 95322 over seasons. The low risk genotypes may have several escape mechanisms besides maintenance of higher moisture status in kernels. Variation in substrate composition, recorded at harvest, in terms of percent oil, fatty acid composition, total sugars, total soluble proteins was not related to the variation observed in the aflatoxin contamination. However, the total phenolics content of kernels at harvest showed a significant negative relationship($r = 0.69$, $P<0.05$) with aflatoxin B1 production. Total phenols act as resistance factor. They are highly reactive on oxidation

and may result in the formation of substances highly toxic to pathogens (Patil and Dimond, 1967).

References

Ghewande, M.P. 1977. Aflatoxin contamination of groundnut and its management in India. Pages 27-31 in Aflatoxin contamination problems in groundnut in Asia: proceedings of the First Asia Working Group Meeting, 27-29 May 1996, Ministry of Agriculture and Rural Development, Hanoi, Vietnam (Mehan, V.K., and Gowda, C.L.L., eds.). Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Patil, S.S., and Dimond, A.E. 1967. Inhibition of verticilium polygalactoronase by oxidation products of poly phenols. Phyto pathology 57:492-96.

Cole, R.J., Sobolev, V.S., and Dorner, J.W. 1993. Potentially important sources of resistance for prevention of preharvest aflatoxin contamination in peanuts. Apres 25:78.