TERMITES AS PESTS OF GROUNDNUTS

P.W. AMIN and D. McDONALD

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) Patancheru P.O., Andhra Pradesh 502 324, India.

Though termites have been recognized as serious pests of groundnuts in the tropics, very little attention has been given to the losses caused by them. Termites can attack planted seed, seedlings, the stems, pegs, and pods of developing and mature plants, harvested plants drying in the field, and pods and seeds in storage. In addition to direct physical loss of yield, there may also be considerable loss of quality. Harris (1969) listed 17 species of termites known to damage groundnuts in the moderate to low rainfall areas of Africa and Asia. In this paper the various kinds of damage caused by termites to groundnuts and measures for controlling them are reviewed.

Preemergence damage

Groundnut yields in India and in other parts of the semi-arid tropics are low, seldom exceeding 700 kg/ha, and this is in part due to suboptimal plant populations resulting from poor seedling emergence. Application of seed protectant chemicals reduces preemergence loss. Most seed dressings used on groundnuts contain both fungicides and insecticides, and while it is generally agreed that the fungicide component plays a more important

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In: Progress in Soil Biology and Ecology. G.K. Veeresh Ed. UAS Technical Series No. 37, pp. 273-278. Raja Power Press Bangalore, India.

part in preventing preemergence damage and losses, there is evidence that the insecticide component can also be important (Clinton 1962B; McDonald and Keay 1974).

Clinton (1962a) in the Sudan estimated that some 15% of preemergence seed loss was due to insect attack and most of this was attributed to termites (probably *Microtermes* spp.). Even slight damage to the seed could facilitate attack by soil fungi, with subsequent rotting of seed or developing seedling.

Postemergence damage

Seedlings, growing plants, and mature plants may all be attacked by termites (Sands 1960; Clinton 1962A; Kaushal and Deshpande 1967; Harris 1969; Rawat *et al.* 1970; Feakin 1973). There is a tendency for severity of termite attack to increase as the crop matures.

Loss of seedlings rarely exceeds 2%, but much higher levels have been recorded on occasion. In young plants the termites bore into the main stem at or just below ground level. They then tunnel down into the root and up into the main stem and branches. Plants so attacked may die immediately but in most cases they survive with little apparent symptoms of damage until the water supply becomes limiting because of drought or with the end of the rains when they wilt and die. Sands (1960)

has observed crop losses of up to 10% from this kind of attack in Nigeria, the problem being most serious in high yielding upright cultivars. In India, severe attack by *Odontotermes obesus* on groundnuts has been reported from Madhya Pradesh (Rawat *et al.* 1970), resulting in plant mortality of up to 35% and severe damage to pods and seeds.

A number of species, of which *Microtermes*, *Odontotermes*, and *Amitermes* are most important, attack both developing and mature pods causing scarification and often penetration of shells. This damage increases rapidly if pods are left in the ground beyond maturity (McDonald and Harkness 1967). Direct pod losses of over 25% have been reported from India (Kaushal and Deshpande 1967).

Termite damage to pegs can lead to their breaking at harvest and pods being left in the groundnut. Combined heavy attack on pegs and pods can lead to total crop loss (Clinton 1962A).

Defoliation of plants by *Trinervitermes* spp. has been recorded, but this kind of damage is relatively unimportant (Feakin 1973).

In recent surveys of the groundnut crop in northern Nigeria it was found that the average crop loss from all forms of termite attack was around 10% (Johnson 1978; Johnson *et al.* 1978).

Use of seed dressings containing insecticides such as aldrin and lindane may reduce termite damage to seedlings.

As a short term control measure where termite attack is serious chlorinated hydrocarbons can be applied in drills at sowing (Clinton, 1962b; Rawat *et al.* 1970). Feakin (1973) recommends use of lindane at 1 to 5 kg/ha, and aldrin or dieldrin at 500 g/ha. Some of the persistent soil insecticides such as dieldrin have been banned in many countries including India. It should be noted that residues of chlorinated hydrocarbon sprays applied to groundnuts or other field crops to control other pests may enter the soil and depress termite populations rendering specific control measures unnecessary.

Repeated mechanical cultivations reduce termite populations but the cultivations carried out by small-scale farmers are unlikely to be effective in this way. Harvesting the groundnuts as soon as they are mature and early removal of produce from the field will reduce the chances of termite damage.

A longer term and more acceptable control measure would be to grow cultivars resistant to termite attack. At ICRISAT in the 1978 rainy season, a large number of cultivars and lines were grown in a replicated field trial and it was observed that they varied in respect to percentages of pods with shell scarification from

0 to 85%. Cultivars NC Acc. 17587, NC Acc. 2560, NC Acc. 2279, NC Acc. 17127 and NC Acc. 17090 all had less than 5% of pods scarified, while pods of NC Acc. 2738 were entirely free from scarification. Elements of choice and escape may have been present, and obviously further work is required to determine if genuine resistance is available.

Post-harvest damage

Damage to pods on plants sun-drying in the field has been reported but is not normally important. Stored groundnuts in pyramids and in sheds have been attacked and this damage can be prevented by incorporating aldrin or dieldrin into the foundations of the stacking plinths or storage shed floors.

Reduction of quality

Damage to pods can reduce seed quality both for planting and for human and animal consumption. Direct damage to the seed renders it liable to invasion by various soil fungi after sowing. Damaged seeds also have a higher rate of buildup of free fatty acids when in storage.

Scarification and penetration of shells of developing pods render them more susceptible to invasion by soil fungi that can attack the seeds. Such seeds may be rotted, or if they are less severely damaged, may be incorporated in the yield

and raise levels of free fatty acids and possibly introduce mycotoxins. Seeds from termite damaged pods have been shown to be more likely to contain aflatoxins than seed from undamaged pods (McDonald and Harkness 1967).

Premature death of plants from termite damage to stems and roots can cause their pods to dry out slowly in the soil before harvest (Perry 1967). Seeds of pods are very liable to be invaded by the toxigenic *Aspergillus flavus* and be contaminated by aflatoxins (McDonald and Harkness 1967; McDonald 1970).

From the limited information available, it would appear that termites are important pests of groundnuts in Africa and Asia. Absence of reports of damage from other parts of the world may reflect less importance being attacked to the pests, or possibly more mechanical cultivations and more common use of pesticides limits termite populations in those areas.

Reduction in seed quality from termites attack could be even more important than direct damage, particularly in relation to possible mycotoxin contamination.

More research is required into population ecology, crop loss assessment, cultural and chemical control measures, and genetic resistance

Summary

Different kinds of damage to groundnuts from termites are described. In addition to causing significant losses in yield by direct attack termites may also cause damage that predisposes pods to invasion by toxigenic fungi. Control measures are briefly indicated.

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APPENDIX 1

List of species of termites known to cause damage to groundnuts. (From: W.V. Harris (1969) Termites as pests of crops and trees, Common. Inst. of Entomology, London, pp. 20-21)

Termite species	Location
Coptotermes formosanus	China
Amitermes evuncifer	Nigeria
Eremotermes rama	Sudan
Microcerotermes sp.	Gambia
Macrotermes bellicosus	Sudan
Odontotermes badius	South Africa
Odontotermes latericius	South Africa
Odontotermes obesus	India
Odontotermes nilensis	Sudan
Odontotermes vulgaris	Senegal
Odontotermes spp.	Tanzania
Ancistrotermes cruciger	Gambia
Ancistrotermes latinotus	Congo
Microtermes throcalis	Sudan
Microtermes sp.	Nigeria
Trinervitermes biformis	India
Trinervitermes ebenerianus	Senegal