Effect of Harvest Date and Termite-Resistant Varieties on Termite and Millipede Damage to Groundnut in Burkina Faso

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In SAT Africa, the groundnut aphid (*Aphis craccivora*), jassids (*Empoasca dolichi* and *E. facialis*), armyworm (*Spodoptera littoralis* (Boisduval)), the groundnut hopper (*Hilda patruelis*), termite (*Microtermes thoracalis*), millipedes (*Peridontopyge* spp.), the groundnut bruchid (*Caryedon serratus* (01.)), and the "Wang" (*Aphanus* (or *Elasmolomus*) *sorditus* (F.)) are considered major pests of groundnut. Termites, millipedes, thrips, and jassids are potential economic pests in Burkina Faso. Of these, termites are the most serious since they not only reduce groundnut yield but also enhance *Aspergillus flavus* infection. Two types of damage to groundnut by termites have been described, invasion of the tap root and pod scarification. Greater yield loss is attributed to damage by tap root invasion. In turn, tap root invasion results in a linear relationship with yield loss. Pod scarification is also accentuated by late harvesting and irregular maturity. Termite damage to groundnut is greater in periods of inadequate rainfall during the latter portion of the growing season. The major significance of pod scarification and penetration by termites is the enhanced entry and growth of *A. flavus*.

Millipedes attack both seedlings and developing pods. Of the 13 species of millipedes reported to attack groundnut, members of the genus *Peridontopyge* appear to be most important. Yield losses of 10-35% have been reported for millipede damage.

Resistance to termite damage in groundnut has been reported. Field resistance to *A. flavus* invasion and aflatoxin formation has also been recently discovered. Although none of the cultivars evaluated for *A. flavus* invasion were immune, J 11 had both resistances to termite damage and aflatoxin formation.

The research reported in this summary was conducted to evaluate the effects of harvest date on millipede and termite damage to groundnut, *A. flavus* and aflatoxin contamination of kernels, and to screen groundnut cultivars for resistance to termite damage.

Materials and Methods

All research was conducted at the Gampela Research Station in Burkina Faso during 1986 and 1987. Treatments were: (1) groundnut lifted at 70 days after planting (DAP), (2) at 90 DAP, (3) at 110 DAP, (4) at 125 DAP, and (5) with 5.6 kg ha^{-1} aldicarb at

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planting, 7.5 kg ha^{-1} chlorpyrifos at pegging, and 7.5 kg ha^{-1} chlorpyrifos 50 days after pegging for insect control, and lifted at 100 days.

The number of plants killed by termite damage or millipede damage during the growing season, and the number of plants at harvest were recorded. On each harvest date, the number of undamaged, termite-scarified, and termite-penetrated pods were recorded. The percentage of pods with *A. flavus* and *A. niger* was recorded and the aflatoxin content in kernels determined.

Ten cultivars with moderate to high levels of resistance to termites, two susceptible cultivars, and two local varieties were evaluated for their performance against termite infestation in Burkina Faso. Plots were harvested at 100 (normal harvest) and 125 (delayed harvest) days after sowing.

Results and Discussion

In 1986, millipede damage was significantly greater in plants harvested at 70 and 90 days than for plants harvested at 125 days.

Termite damage to plants and pods was very low through 110 days. However by 125 days, termite damage to plants and termite-scarified and penetrated pods had increased substantially (40% or over in all cases). Pod yield in 1986 was significantly heavier for the control, where insecticides were applied to reduce insect damage, than yields from all other harvest dates. Yields increased with longer growing time.

In 1987 the number of plants per plot decreased with the length of the growing period, probably reflecting millipede and/or termite damage. Damage to plants in the control plots was very slight.

Plants harvested before 110 days showed negligible damage; but those harvested at 110 days (3.8%) and 125 days (17.6%) had increased damage. Similar trends were recorded for termite-damaged pods, with the 125-day harvest having 60% damaged pods and 45% scarified pods. As in 1986, yields were heavier for the insecticide-treated control, and increased with time up 110 days for the other treatments. This year the 125 day harvest, although having similar damage to the 1986 season, decreased by 25% compared to the 110-day harvest.

Pod scarification and penetration by termites were enhanced by late harvest, and pod damage was greater on plants where the tap root had been invaded and the plants killed by termites. Inadequate rainfall during the period from 100 to 125 days also favored increased termite damage, especially pod damage.

Delayed harvest also enhanced *A. flavus* invasion of groundnut pods and kernels. Similarly, kernels from the delayed (125-day) harvest had significantly more aflatoxin in both years than kernels from the other treatments.

In the evaluation of groundnut cultivars for resistance to millipedes and termites, millipede damage was significantly greater on QH 243. The lowest millipede damage was recorded for NC Ac 2142 and NC Ac 2243. NC Ac 2142 and Robut 33-1 also sustained significantly more termite damage than several other varieties. No termite damage to plants was noted on Robut 33-1, NC Ac 343, Nc Ac 2240, NC Ac 2242, NC Ac 2243, and NC Ac 10033 for the normal harvest. The entries RMP 40, NC Ac 2240, NC Ac 2243, NC Ac 343, and Bonga, a local cultivar, showed least termite damage to plants and pods while, with the exception of NC Ac 2243, maintaining acceptable yields.

In conclusion, termite damage to groundnut and associated aflatoxin contamination

of kernels are among the most serious latter part of the growing season. In Burkina Faso, both the beginning and end of the rainy season pose problems for crop production. If rains are delayed at the beginning of the rainy period, groundnut may not have time to mature, and kernels in immature pods are more susceptible to *A. flavus* invasion and aflatoxin contamination during drought at the latter part of the growing season. Similarly, erratic rainfall during the latter part of the growing season increases the probability of termite damage to groundnut plants and pods, and *A. flavus* invasion and aflatoxin contamination. Research on the relationship of groundnut harvest date, termite damage, *A. flavus* invasion of pods, aflatoxin formation in kernels, and evaluation for termite resistance in cultivars offers potential for greatly reducing this problem in West Africa. Cooperative research among scientists at the University of Ouagadougou, ICRISAT and the USDA-ARS, University of Georgia, on these problems is continuing.