

The study was conducted in Western Kenya, a prime banana growing area during the period of May 1996 to February 1999. The objectives were to control the banana weevil and parasitic nematodes with neem materials, thereby reducing yield losses and contributing to sustainable banana production.

The repellent, antifeedant, ovipositional deterrent, and growth inhibitory effects of powdered neem seed (NSP), Kernel (NKP), cake (NC) and neem oil (NO) on *Cosmopolites sordidus* and its population build-up were studied in the laboratory and outdoors tests at ICIPE's Mbita point field station (MPFS).

In choice tests, 48h after release, less than 30% of weevils settled under neem-treated banana corms while more than 75% settled under untreated corms. In a feeding test, weevil larvae did not feed or fed little on neem-treated corms. Larvae caused little damage to neem-treated corms, but untreated corms were heavily damaged, indicating a strong repellent and antifeedant effect of neem seed derivatives on *C. sordidus*.

Compared with the untreated control, 3-10 times fewer eggs were laid by female in neem-treated corms. Egg hatchability was less than 25% in neem-treated corms and more than 50% in the control.

Neem treatments also inhibited larval growth and development. Forty to 60% of 2nd-instar larvae died in 14 day when confined to neem-treated banana pseudostems, the survivors were small in body size and weighed 4 to 6 times less than those in the control where less than 20% larvae died and adults were recovered. The higher the concentration of neem materials, the higher was the severity of effects.

Efficacy of neem materials against the banana weevil and parasitic nematodes was evaluated under controlled pest infestation levels at MPFS. Effective rates, methods and frequency of application of the selected neem materials were determined at MPFS and in Farmers' fields, under different levels of soil fertility and pests infestation.

In a pot experiment, four weeks after planting, NSP, NKP, or NC was applied at 5g per plants inoculated with 500 nematodes and 5 pairs (females and Males) of the banana weevil. Compared with control, 1.5 months after the treatment, neem materials application significantly reduced the nematode population and weevil damage on a par with Furadan applied at 5 g/plant. Similar results were obtained with the application of neem materials to pared or unpared banana suckers planted in 100 or 200l drum's capacity and inoculated with 2000 nematodes and 5 pairs (female and males) of the banana weevil per drum.

NSP-or NC- treated unpared suckers supported much fewer nematodes than the pared treated suckers with same neem products, obviating the need for paring of suckers. NKP and NO applications were toxic to the banana plant and were excluded from further testing.

Soil application of powdered NSP or NC against the banana pests was more effective than their application in aqueous forms. Application of NSP or NC at planting time and then at 1, 2, 3, or 4- month intervals to plants grown under controlled pest infestations in drums significantly

reduced nematode density and the weevil damage. Similarly, in farmers' fields, soil application of NSP or NC at 60, 80 or 100 g/mat at planting and then at 4 month-interval significantly reduced the weevil and nematode damage. Although the application of NSP or NC at 200 to 400 g/mat at 6 month-intervals significantly reduced the nematode population and weevil damage, they were toxic to the banana plant.

Application of NSP or NC at 60, 80 or 100 g/mat at 4-month intervals to a fertile soil with a moderate pest load, increased yields by 27-50% over the control during the 1st crop and by 30-60% during the 2nd crop. Furadan increased the fruit yield by 27% over the control in the 1st crop but dropped down to -2% in the 2nd crop. Under low soil fertility and high pest infestation levels, the neem treatments also controlled the pests and markedly increased the yield 7 to 10 times more than that in the control during the first crop. During the second crop, all plants in the control plots dried up before fruiting, but neem-treated plants continued to produce bunches.

Depending on the soil fertility and doses of application, net gain over the control obtained with the application of NSP or NC ranged from US \$ 70 and US \$ 800 per hectare. However, a loss of US \$ 700/ha was observed with the Furadan application. Neem application of doses higher than 100 g/mat was also uneconomical. The beneficial effects of neem seed materials application on the banana plant growth, pest control, and implications of these findings in the banana pest management and further areas of investigation are discussed.