## Weaver ants can boost cashew yield

The cashew (Anacardium occidentale) was introduced from Brazil in the 16th century and has become an economically important cash crop for a number of African countries. Yields, however, are badly affected by pests. Researchers from the International Institute of Tropical Agriculture (IITA) have found a local answer.

In the Benin Republic raw cashew nuts have replaced cotton as the number one agricultural export produce and account for over 13 per cent of export earnings. Production is, however, severely constrained by infestation by several insect pests, sap-sucking insects, leaf miners, branch borers, coreid bugs, mirid bugs, and thrips, which adversely affect the quality of harvestable nuts and causes yield losses of up to 80 per cent.

In a recent report published in the Journal of Agricultural and Forest Entomology, a team of researchers that includes Dr Jean-François Vayssières, IITA entomologist, present remarkable findings. Cashew nut yields can be boosted by as much as 78 per cent with weaver ants only, and 151 per cent with ants and GF-120 bait sprays, when treatments incorporating the African weaver ant (Oecophylla longinoda) are employed against Béninois insect cashew pests.

The researchers carried out their two-year study on a cashew orchard in the Parakou area of Bénin. First they divided the cashew trees into three blocks. Each block was then divided into four treatments, each with 72 trees.

The treatments were as follows: a plot of trees colonised by weaver ants (ants); a plot of trees colonised by weaver ants fed with sugar solution (ant feeding); and an integrated pest management system (IPM) consisting of a plot of trees colonised by weaver ants and with spot application of GF-120.

GF-120 is a biopesticide mixed with protein bait compatible with organic production but detrimental to cashew pests. Finally, the control treatment against which the performance of the other treatments was measured consisted of a plot of trees not subjected to any form of pest control.

Trees protected by weaver ants were compared with those without any form of protection. They found that nut yield



Nest of weaver ants (O. longinoda) on cashew tree (Anacardium occidentale).

Credit Jean-François Vayssières, IITA

and weight increased by 78 per cent and 73 per cent for the ants treatment, by 122 per cent and 118 per cent for the ant feeding treatment, and by 151 per cent and 141 per cent for the IPM treatment compared with the control.

"The presence of weaver ants patrolling the trees provides protection against pests," said Dr Vayssières. "They can have a direct impact by capturing insect pests such as cashew bugs and also provide, 'visual and olfactory cues' that act as a repellent."

The efficacy of weaver ants as natural biocontrol agents against a wide range of pests as shown by this study is in harmony with findings from previous studies carried out by Dr Vayssières in 2008. These demonstrated that Oecophylla Ionginoda was efficient in repelling and reducing damage caused

by these dangerous fruit flies—Bactrocera dorsalis, Ceratitis capitata, and Ceratitis cosyra—in mango and citrus plantations.

An unexpected finding from the present study, however, revealed that treatments using weaver ants and sugar-fed weaver ants led to an increase in thrips activity which resulted in a higher than expected reduction in nut quality. Conversely, when weaver ants were used in conjunction with GF-120, nut quality was enhanced and thrips damage reduced.

Therefore an IPM programme incorporating weaver ants and GF-120 or a similar pesticide is recommended. Because organic pesticides are expensive, more studies are required to determine the cost effectiveness of this kind of programme to ensure that the

gains from an increased yield are not eroded by the costs of the treatments.

Dr Vayssières also confirmed that there are other control methods focused on thrips to be tested in this way. He added "The red ants, O. longinoda, are particularly suitable for African developing countries where fruit trees are rarely monitored for pests and where IPM is hampered by high tree size and inadequate/insufficient farmer knowledge. Weaver ant technology is cost free, labour saving, self-regenerating, and requires few interventions of African growers.

"This conservative biological control method is thus especially suitable for smallholder growers in sub-Saharan Africa. The long history of the technology in Asia with Oecophylla smaragdina illustrates how this biological control of predators has great promise as a component of an efficient and sustainable IPM for smallholders (cashew, mango, citrus) in all sub-Saharan Africa."

For more information contact IITA, PMB 5320, Oyo Road, Ibadan 200001, Oyo State, Nigeria. Tel: +234 700800IITA, +1 201 6336094; Fax: +44 208 7113786; Email: iita@cgiar. org; web: www.iita.org



Capture of a coreid bug by O. longinoda on cashew leaves.

Credit Jean-François Vayssières, IITA

## Push-pull technology stabilises cereal—livestock systems in East Africa

A climate-smart version of the *icipe* push-pull technology is enabling farmers living in some of the East African regions most severely affected by climate change to stabilise their cereal–livestock mixed production systems.

In a paper published in the recent issue of Field Crops Research journal, icipe and collaborators show that the climatesmart push pull is not only enabling farmers living in such areas to continue cultivating cereals, but to also increase yields by 2.5 times, and in addition, integrate dairy farming into their production systems, despite challenges posed by climate of change.

Push-pull is a platform technology developed over the past 20 years by icipe in collaboration with Rothamsted Research, United Kingdom, and partners in eastern Africa. This simple cropping strategy simultaneously addresses the five key constraints of cereal–livestock mixed production systems in Africa – insect pests (stemborers), the parasitic weed Striga (and other weeds), poor soil fertility, soil moisture management, while also fulfilling the need for high quality animal feed.

The push-pull technology involves intercropping cereals with a pest repellent plant, such as desmodium, which drives away or deters stemborers from the target food crop. An attractant trap plant, for instance Napier grass (Pennisetum purpueum), is planted around the border of this intercrop, with the purpose of attracting and trapping

the pests. As a result, the food crop is left protected from the pests.

In addition, desmodium stimulates suicidal germination of Striga and inhibits its growth. Push-pull also has significant benefits for dairy farming, since silverleaf desmodium (Desmodium uncinatum) and Napier grass are both high quality animal fodder plants. Additionally, desmodium is an efficient nitrogen fixing legume, which, therefore improves soil fertility. Moreover, because both plants are perennial, push-pull conserves soil moisture and continually improves soil health.

Currently, close to 110,000 farmers