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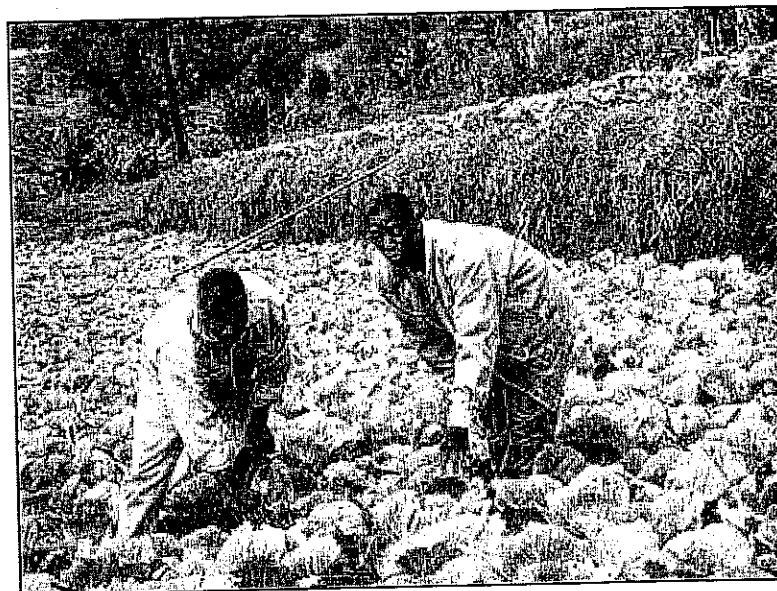
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Wasp vs moth

Cabbage farmers in Wundanyi are reaping the benefits of an ICIPE project to control the destructive diamond-back moth with a parasitic wasp

Simon Mwacharo has the demeanour of a man about to burst into song. There is the denim suit, the jaunty cap, the gleaming eyes, the energetic gestures and the spring in the walk. There is even the backdrop of the world-famous Taita Hills, with their ever-so-slight resemblance to Hollywood's Mount Lee. This exuberance is not misplaced on this small-scale farmer from Wundanyi, for in just three short years, Mwacharo has gone from next-to-nothing, to a point where he can easily cough up 30-odd thousand shillings for a water pump and throw in a grade cow at Sh25,000 for good measure.



Cabbage farmer Simon Mwacharo (left) discusses life after the diamond-back moth with Wundanyi Divisional Horticultural Officer Paul Onano.

Divisional Horticultural Officer, Paul Onano, says that the lean times that Mwacharo and fellow farmers in Wundanyi have experienced hitherto, have been despite the multiple geographic blessings of the area. Being the highest point in Coast province (at an altitude of about 2,000m above sea level), Wundanyi, one of the six divisions of Taita Taveta district, has a low temperature, ideal for the cultivation of horticultural crops. In Mwacharo's home village of Werugha, farmers concentrate on growing *Brassica* cabbages and their cousins, kales (*sukuma wiki*). These two vegetables find ready markets in

Kenya

adjacent tourism attractions the neighbouring Tsavo West National Park and the city of Mombasa, just over 100km to the south.

However, as Onano explains, the full benefits that Wundanyi farmers should have been reaping, have long been nipped in the bud by several factors.

"Climatic conditions in this area are very harsh," says Onano. "We get unreliable and inadequate rains. Then there are marketing problems and the infrastructure is appalling". His last point is supported by visual evidence of narrow, unpaved roads, winding up and down the ridges of Wundanyi with their loam clay soils, which would be quite literally an uphill task in the rainy season. Also equally apparent, is the problem of minute land sizes: Most of the individual farms are no larger than one acre.

But probably the worst problem that this farming community has had to face is the diamond-back moth, one of the most devastating pests of the cabbage. Despite its minute size about 8mm in length, with a wingspan of about 155mm the diamond-back moth (*Plutella xylostella*) can ruin cabbage heads to a point where they are no longer marketable.

The moth's destruction of the cabbage takes place during its larval stage about 10 days of its 15-17 days lifespan. The larvae feed on the cabbage head making the leaves look skeletonised and contaminating it with faecal matter. Control of the pest, which is so cosmopolitan that it tolerates tropical, subtropical and temperate climates, has remained elusive for a long time.

Mwacharo's face contorts with retrospective frustration as he recounts his many lost battles with the greyish-brown insect, which is notorious for developing resistance to pesticides.

"I used to spray my cabbages after every seven days," he says. "But I would still find the butterflies' fluttering in air like this..." He demonstrates with a frantic flutter of hands, fingers dancing in the air. Every season he would lose close to 90 per cent of his cabbage crop. By his own admission, he was on the brink of giving up cabbage farming.

Enemy action

That was before researchers from the International Centre of Insect Physiology and Ecology (ICIPE) came to the rescue. As part of its research into "integrated pest management strategies" for various crops, ICIPE had started a project in 2000 to control the diamond-back moth biologically by introducing its natural enemies (parasitoids) into its habitats.

"Intensive studies carried around the world have found that biological control the use of a living organism to control pests is both safe and sustainable," explains Dr Bernhard Löhner, Project Coordinator for Diamond-back Moth (DBM) Project at ICIPE. He adds that a survey by ICIPE in the major cabbage growing areas in Kenya, Uganda and Tanzania, had established that existing natural enemies were not

providing a significant impact in the control of the moth. ICIPE, therefore, imported an exotic parasitoid, a parasitic wasp (*Diadegma semiclausum*), which was already being used in New Zealand and countries in South East Asia.

In 2003, ICIPE's project was ready for field trials and, on the recommendation of the Kenya Standing Technical Committee on Imports and Exports (KSTCIE), Wundanyi was chosen as one of the sites. Seven farmers in Werugha village's Marumange Valley Mwacharo being one of them benefited from the parasitoids released. Forty wasps twenty females and twenty males were released in each of their farms.

Mwacharo confides: "At first I wasn't sure this *mdudu* was working... so I continued spraying." His scepticism was due to the fact that *D. semiclausum* does not have a knockdown effect: It stings the diamond-back moth larvae, and then lays its eggs into them. When the eggs hatch, they feed on the moth's internal organs causing its death. When the wasp's larvae reach the pupa stage, the diamond-back moth turns brown and hard and remains stuck to the cabbage leaves. The adult parasitic wasps then emerge from the carcass in a few days.

After being trained by ICIPE, Onano and his colleague Shadrack Juma explained how the wasp works to the farmers through a series of seminars. The farmers soon embraced the technology and stopped spraying.

Every month, a team from ICIPE, led by senior research assistant Gatama Gichini, collects information on the population dynamics of the moth and parasitism rates in each of the pilot site farms.

"The results were encouraging," reports Gichini. "Diamond-back moth populations declined right after the releases and parasitism increased from below 10 per cent before to a maximum of 80 per cent. After only half a year, (the moth) had ceased to be a problem for the farmers."

The *D. semiclausum* parasite has not only established itself, but has also spread widely, such that today, Mwacharo's good cheer practically reverberates across the ridges to 400 other farms, over a 20km radius. Also reaping the benefits of the wasp are members of the Umoja Self-Help Group 10 or so women and two men who jointly own a piece of land a few kilometres south of Mwacharo's farm. Secretary Marjorie Mwalugha, who has taken time to list the gains in writing, paints a vivid before-and-after picture: "The cabbage is not just our main cash crop: It is also part of our daily diet. We now see how we must have been doing a lot of damaging to our bodies, and why our stomachs used to rumble so. Now that we don't spray our cabbages, our stomachs are quiet. We could never be sure there were no residual insecticide on the vegetables we took for our own household use."

Other items on Mwalugha's list include the restoration of the areas biodiversity. She tells how all the birds, which had disappeared, and all the water animals had been driven away by pollution, have

returned. She talks of the savings the group is making now that constant pesticide spraying is not required, and how the money is now being used to buy manure, build better houses and send children to school. The increased cabbage cultivation has also created employment opportunities for the group's youth who come handy in tilling the land and so on. The Umoja Self-Help Group has even opened a bank account for its surplus funds. "*Hatusumbuki ata kidogo* (Everything is just fine)," Mwalugha emphasises.

As in most cases, benefits of this nature tend to be ambivalent. The reduction of the diamond-back moth has meant lower production costs. (The Umoja Self-Help Group has worked it out to Sh1 per cabbage.) With minimal damage to the crops, farmers are able to get greater volumes cultivating the same area. Mwacharo used to plant just 25gm of seeds. He has now upped this to 50gm, giving him 5,000 heads, and intends to double that in the near future. Cabbage farming has become attractive again and more farmers are returning to it. As a result, production, according to Onano, has gone from 25 tonnes to 30 tonnes per hectare. This is not necessarily good for the market, as over-supply will lower prices.

Mwacharo is not worried about such a possibility: "Farmers are not stupid... they talk to one another," he says. "You won't find everyone in this valley growing cabbages."

Dr Löhrr suggests investing in other crops suitable for the area, which could include tomatoes, broccoli and cauliflowers. Farmers could also make use of a planting calendar. Although proximity to the Mombasa market gives them an edge, Wundanyi farmers have to watch out for the cabbage crop from up-country. January through to April the months when cabbages in the Kinangop and Uplands areas are out of season are good months for Mwacharo and his neighbours.

There are other pertinent issues, such as that raised by Jonam Mugho of the Umoja Self-Help Group: "What will happen when the *D. semiclausum* has eliminated all the diamond-back moths? Will it become a nuisance itself?"

Dr Lohr explains that numerous tests were carried out before a permit was given to release the wasps, and all the risks were taken into account.

"*Diadegma* was selected because it only lives off diamond-back moths," Dr Löhrr explains. "Once their population is reduced, *Diadegma* numbers will also decline and both will coexist at very low numbers."

ICIPE is also not overlooking the effect of other pests on cabbage yields. Indeed, the Wundanyi farmers are at the moment concerned about aphids. Since using chemicals on these pests would kill the diamond-back moth's natural enemy and take them back to square one, ICIPE is assisting the farmers in the adaptation of safer methods.

"We have taught the farmers how to scout to determine the need for pesticide application," says Gichini.

Dr Löhrr adds: "Aphid attack is easily detected and as they attack a

few plants at a time, any conventional pesticide registered for vegetables can be used as a spot spray on the affected plants only."

The Wundanyi farmers seem geared for prosperous cabbage farming, especially if they heed the advice District Agricultural Officer Munyi Ali Mwakuvunza, who while commending the biological control project, also urges: "*Mwerefu ni mwenye kushika* (The wise one understands and embraces it)..."

No doubt the Wundanyi farmers share this same viewpoint. The women with their bright *khangas*, and the enthusiastic father-of-three Mwacharo, are all singing from the same hymn-sheet.

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