A cassava crop infested with white flies in Uganda. Photo Credit: Lominda Afedraru

Whitefly-resistant cassava varieties lift yields in Uganda

By Lominda Afedraru

MOST of the research efforts have focused on the management of the two viral diseases affecting cassava namely cassava mosaic disease (CMD) and cassava brown streak disease (CBSD).

The two diseases severely reduce cassava productivity in sub-Saharan Africa, causing more than USD 1 billion annually, according to a 2018 publication by cassava scientists at Uganda's National Agricultural Research Organisation (Naro).

But little attention has been paid to the whitefly – the insect vector that is driving the spread of multiple viruses in cassava, including those that cause CMD and CBSD.

Entomologists have identified approximately 1,500 species of whitefly in the entire world.

In tropical regions, the bulk of cassava crop losses are attributed to Bemisia tabaci species.

Scientists say whiteflies are difficult to control because they breed multiple times in a year.

The insects thrive under conditions of high temperatures and low rainfall plus relative humidity.

In the late 1990s, CMD was rapidly spread by the whitefly vector through southern Uganda and into neighbouring countries in East Africa.

By the mid-2000, 11 countries across East and Central Africa were affected by a severe CMD pandemic.

Average yield losses of nearly 50 percent were reported due to CMD, causing food shortages and localised famine in the region.

Various control measures were employed to manage the disease, although more emphasis was put on developing virus-resistant cassava varieties.

Both conventional and transgenic breeding efforts were applied to identify sources of resistance and to incorporate these into farmer preferred cassava varieties.

A number of cassava varieties varieties to CMV and CBSV were released but they have since succumbed to CBSV.

It is against this background that scientists from the National Crops Resources Research Institute (NaCRRI) in 2014 began breeding cassava varieties that can tolerate the whitefly infestation.

Studying behaviour of the whiteflies

Dr Chris Omong, the programme leader of root crops at NaCRRI and the principal investigator in the whitefly cassava breeding project, said that his team began by studying characteristics of the insects.

The eight-year project was funded to the tune of USD 1 million by the Bill and Melinda Gates.

The researchers found there are four species that are deadly in infesting cassava fields and the adults disperse mainly by the aid of wind moving short and long distances.

Humans also aid the spread during planting by using infested planting materials. These species spread CMV and CBSV while at the same feeding on cassava leaves, causing the leaves to moult as well as causing wrinkles on the upper leaves.

If large populations develop early in the life of the crop, the plant vigour and tuber sizes are reduced, causing stunting.

The large whitefly populations cause the production of honey dew, which falls onto the lower leaves. This is subsequently colonised by black sooty mould, which reduces the ability of the leaves to photosynthesise and contribute to yield losses by over 50 percent.

Two new varieties, which have been released, are capable of giving a harvest of 12.8 tons per hectare.

The two varieties namely Nkumba and UG120/193 are also tolerant to whiteflies.

Breeding processing

They were developed crossing cassava varieties obtained from Colombia with Narocas1 and 3 variety and a variety called Nkumba, which was obtained from Tanzania.

Farmers who have started growing these varieties say are doing well on farm.

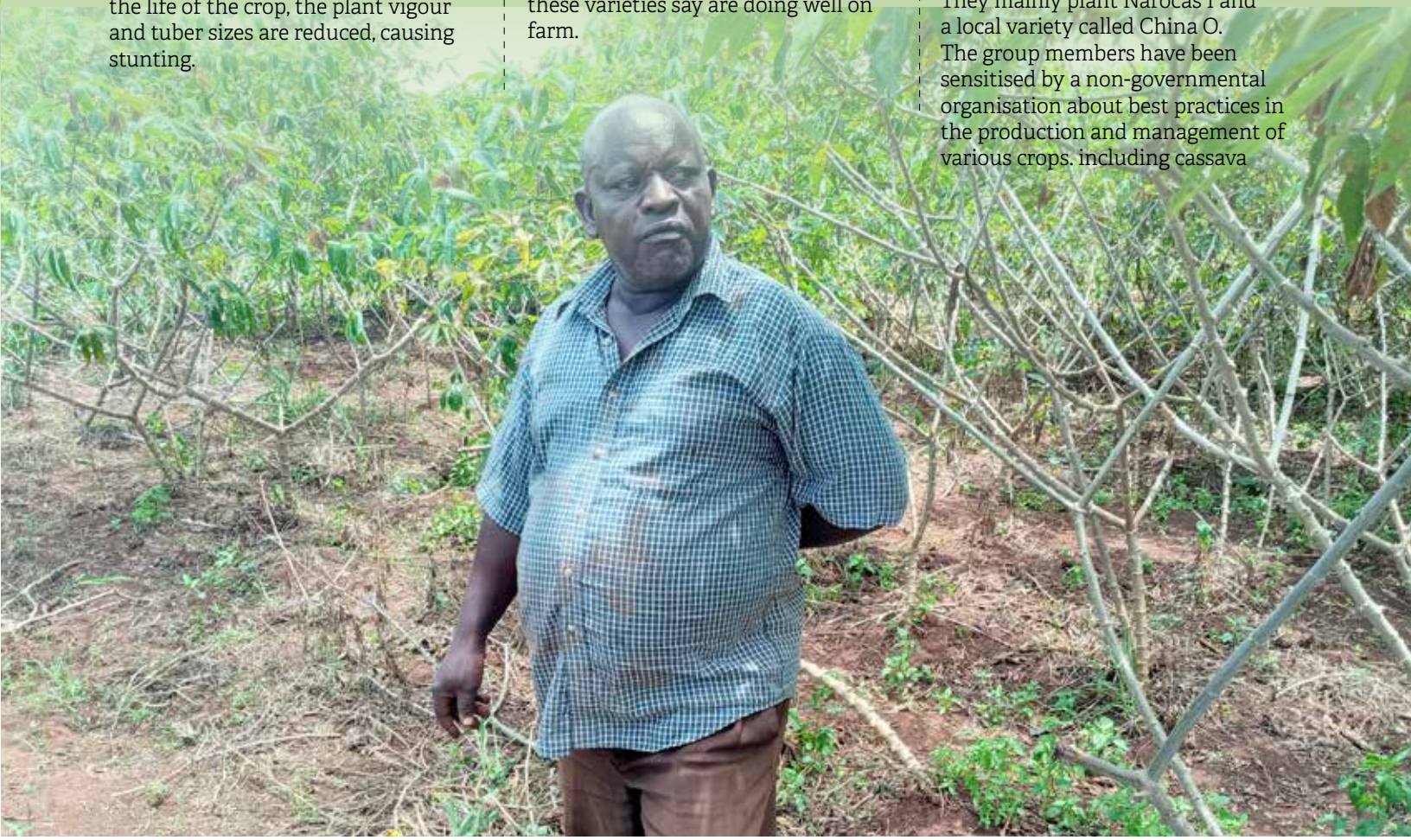
In Bugiri District, the two farmer who offered two acres of land each for demonstration are James Mwanje from Matovu farmers' Association and Jacob Othieno from Ryempkyandi Farmers Association.

Mr Mwanje says their farmer group comprises 30 members most of whom have been growing Nase14 and a local variety called Nigeria, Chai, Mufumba and Magana plus the improved variety Narocas I.

He has been engaged in cassava growing since 2014, and recently he harvested Narocas I on his one acre and UGShs750,000 from selling the produce.

Mr Othieno's group of 169 members is unique; they process their cassava into dry chips and sell to consumers at UGShs400 a kilo in the local market.

They mainly plant Narocas I and a local variety called China O. The group members have been sensitised by a non-governmental organisation about best practices in the production and management of various crops. including cassava



One of the farmers from Ryempkyandi Farmers Association in Bugiri District, who offered an acre of his land for demonstration. Photo Credit: Lominda Afedraru