

Cinzana Agricultural Research Station

Crop research project



Millet - more than just a food item

1. [The Cinzana Research Station: its aims ...](#)
2. [... and the thinking behind it](#)
3. [Research results so far](#)

For small-scale farmers In the Sahel zone, millet and sorghum are virtually sacred basic foodstuffs. But low rainfall, poor soil, and a lack of equipment mean that crop yields have been stagnating or even declining. The agricultural research station at Cinzana in Mali, supported by the Syngenta Foundation for Sustainable Agriculture, is developing and disseminating improved seed for millet, sorghum, and cowpea, as well as adapting cultivation methods.

In international agricultural research, attention has focused on wheat, maize, and rice. While these cereals have high requirements (climate, soil quality, irrigation, etc.) that make them incapable of meeting food requirements for the growing population in the arid countries of the South, resistant food crops such as millet and sorghum have long been neglected.

This research deficit, as well as the urgency of the food problem In the Sahel zone, were the main reasons for founding and supporting the *Station de Recherche Agricole de Cinzana* in Mali.

1 The Cinzana Research Station: its aims ...

The Cinzana Research Station aims to improve food security In the Sahel region through sustained increases in the yields of the most important food cultures - millet and sorghum. Millet in particular is more than just food to small-scale farmers In the Sahel. It is used in barter trade and is a status symbol ([see case study](#)). The improvement of nutrition and income is achieved

specifically by developing, providing, and disseminating improved seed varieties and cultivation techniques for intensive farming. At the same time, efforts are being made to improve access to equipment, transport, and markets as well as to provide storage facilities.

» [From the field: "Sufficient millet is crucial for our existence"](#)

2 ... and the thinking behind it

The foundations for the Agricultural Research Station at Cinzana were jointly laid in 1979 by the government of Mali, the U.S. Agency for International Development (USAID), the International Crops Research Institute for the Semi-arid Tropics (ICRISAT), and the Syngenta Foundation for Sustainable Agriculture's counterpart at the former Ciba-Geigy corporation.

The planning and construction of the station were organized jointly by the partners involved. While the Malian government provided the land and designed the station in collaboration with ICRISAT, including research establishments and experimental fields, USAID and the Ciba-Geigy Foundation met the investment costs. At the same time, all the partners involved provided technical support.

The station became fully operational in 1983 and started its research work. Situated near the small village of Cinzana, 35 km east of the provincial capital Ségou, the research station is located in the middle of one of the most important millet-growing areas in Mali. The station now has 220 hectares of land, with five different types of soil, of which approximately 80 hectares per year is used for breeding and research purposes. A fallow system is used at the station - i.e., the cultivated areas change from year to year. In addition, several hectares of land have been set aside as a nature reserve, allowing observation of the development of biodiversity in natural conditions for a period of more than 20 years.

The station also has a good infrastructure, with everything from office buildings to research laboratories, a computer room, a library, accommodation, a restaurant, and guest rooms available. In addition, supplies of electricity and water (including water for irrigating the test fields) are ensured by the station's own equipment.

The research station is responsible to the Malian government and is subordinate to the Institut d'Economie Rurale. It belongs to a network of eight agricultural research establishments distributed throughout the country (these include Soutuba, near Bamako; Sikasso (mainly for

cotton), Mopti, and Gao, in the north of Mali; Kayes in the west; Samé; and Niono) The aim of this network is to cover the various production conditions in the individual regions of Mali and the variety of crops cultivated. Financial support from USAID and ICRISAT expired according to contract in 1989, although close specialist collaboration still continues in Mali with programs managed by the two organizations. The Syngenta Foundation is now the sole financial sponsor for the Cinzana station. The Malian government meets the staffing costs for state employees at the station, as well as the costs for most of the spare parts and maintenance required.

3 Research results so far

In the initial years, the main emphasis was on basic research on millet and sorghum. From the 1990s onward, work moved more into the field, with three external stations being built (in the north, south, and center of the station's reference region) in order to take better account of the various climatic and natural conditions during the research. In addition, various "antennae" have been set up in villages, where staff from the station are supervising tests in collaboration with the small-scale farmers and introducing innovations. A number of technologies have emerged from these research activities, for which documentation has been prepared and published.

» [See millet research findings](#)

3.1 Breeding improved seed

Breeding improved seed varieties has so far concentrated on making varieties available that have a shorter growth period, in accordance with the climatic conditions in the arid north of Mali. A seed bank was set up for this purpose, in which some 1,200 different varieties of millet are available, as well as various sorghum and cowpea varieties. A few genotypes with the desired properties can be selected from these, tested, and reproduced without the genes of other traditional varieties being lost.

The main varieties selected were particularly high-performing domestic ones appropriate to the local ecological conditions. In the course of time, these were then crossed with various selected varieties. This has resulted in the millet variety *Toroniou de Ningali*, for example. At 1.1 t/ha, this variety has a yield twice as high as varieties grown in higher-rainfall areas in the south of the country. *Toroniou* not only has the shorter growth period desired, but also has a higher tolerance for drought and pests. Breeding particularly resistant varieties is therefore also part of the station's research activities. In this way, millet varieties that are resistant both to diseases (e.g.,

mildew) and pests are bred, as well as varieties that have hairy corn-cobs, to keep birds away from the crop. Sorghum species suitable for The Sahel's various vegetation zones (semiarid, subhumid, etc.) have also been developed.

3.2 Developing modified cultivation techniques

In addition to breeding, several researchers at the station are also working on developing adapted cultivation methods. For example, it was found that if dense seeding is used, a productivity increase of 10-30% can be achieved by annually alternating the cultivation of millet and cowpea (*niébé*). The increase can be as much as 25-40% if the seed is sown before July each year.

Another development at the station has been the use of carefully alternated millet and cowpea rows in a field, with the rows being switched each year. The planting distance is precisely determined, and both types have to be sown on the same day.

This quite simple improvement has the following advantages: thanks to their tuber bacteria, the cowpeas can fix nitrogen from the air and thereby enrich the soil. The risk of crop losses when there is irregular rain is reduced because the available moisture is better exploited. In addition, this method makes it easier to tend mixed cultivation. The cowpea's tolerance of and partial resistance to *Striga*, a semiparasitic wild plant, inhibits the weed's spread. Due to the differing growth periods of cowpea and millet, the fragile soil has cover for a longer period, and is therefore better protected against erosion by rain and wind.

In addition to the mixed cultivation of millet and cowpea, millet and peanuts or maize have also been planted in alternating rows. Here again, the aim is to reduce the risk of crop losses due to drought, pests, and disease, as well as to exploit the available soil nutrients better. For example, peanuts reduce the extent to which *Striga* can attack millet.

The research station is also working on improving fertilization techniques using farmyard manure and composted millet stalks. For example, it has been found that adding straw can increase the fertilizer content by 42%, without reducing the nitrogen content. Field experiments have shown that a 30-35% higher yield is possible using this simple fertilization technique.