

HAS AFRICA SUFFICIENT INFRASTRUCTURE TO IMPROVE YIELDS?

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Many lessons were learnt the hard way in North America and Europe in their development of modern agriculture, capable of producing high yields economically. A key factor has been the importance of agricultural research at State or national universities and Government centres often directly linked to extension services.

In contrast, crop yields remain poor in comparison with Global standards in many parts of Africa. Food aid is desperately needed even in Zimbabwe, where politics have interfered with a highly successful farming system. Civil wars have interrupted the change from colonial governments to the promises of the new African governments. The young people wanting to succeed have opted to become lawyers and doctors rather than agriculturalists like their fathers, and, sadly, when moving to the USA or Europe to complete their education have often stayed, rather than return home to support the development of their own economies. National governments have failed to recognise the development of their own agriculture to feed growing populations that have migrated to the cities to avoid the drudgery of traditional subsistence farming systems. Indeed, much emphasis has been given to maintain subsistence farming and promoting



Field of cotton in Burkina Faso with BollgardII gene. Without any insecticide sprays it has given excellent control of bollworms compared to a neighbouring field of non-GM cotton that had been sprayed five times.

‘organic’ agriculture, despite the low yields achieved without appropriate pest management and other inputs required to sustain agricultural production. International aid has supported research with the establishment of International Centres, such as the International Institute for Tropical Agriculture (IITA) set up in Ibadan, Nigeria, but unlike the work at CIMMYT in Mexico and IRRI in the Philippines where results were quickly absorbed by farmers in Asia and the Americas, IITA became rather separated from African farmers, as throughout the continent Governments failed to support their research scientists and extension staff. Poor pay, with inadequate funding for field work and other factors has meant that their efforts have had little impact on crop yields. There are always exceptions, the development of biological control of cassava mealy bug by IITA and the development of NERICA rice varieties by the Africa Rice Centre (WARDA), whose work was disrupted by the civil war in Cote D’Ivoire have been very successful.

The promotion of ‘organic’ agriculture might make sense if there were suitable varieties resistant to the main pests and diseases, but this is rarely the case and other technologies such as biological control or use of pheromones have rarely been pursued to achieve economic success. The vast number of small scale farmers in Africa have wanted to use pesticides to improve their yields, but there has not been sufficient independent research to provide sound advice on what pesticides should be used, when and how to apply them. In addition, there has seldom been sufficient support in terms of credit, local supply or appropriate products and advice to ensure that their use has been effective. Government



Cocoa pods in Cameroon showing lack of control of black pod as farmers do not have the fungicides to spray as result of lack of credit, so yields generally less than 400kg/ha. The photo has a particularly bad pod at top of picture.



Signs of jassid damage on cotton in Burkina Faso.

authorities have not developed sound registration systems so that often the most highly toxic pesticides were used as they were the cheapest available and often perceived to act more rapidly. Nor has there been the back up of analytical laboratories to check for the level of residues in crops, which is a considerable concern as the EU imposes limits on maximum residue levels (MRLs) in crops exported to Europe. In particular, there has been considerable debate about the use of DDT to control *Anopheles* mosquitoes, vectors of malaria, despite its considerable effectiveness when used as an indoor residual spray in houses to reduce the cases of malaria significantly. This lack of adequate infrastructure is despite the use of pesticides in Africa over the last fifty years. Indeed there are many problems due to the large-scale purchase of pesticides in emergencies, notably for locust control, which often arrived after the pest infestation had subsided so that there are obsolete stocks that need to be removed – at great expense. Many difficulties, such as in cocoa, relate to the lack of credit for farmers, or local price stabilisation in a world in which global prices for the crop suffer major fluctuations, and the problems of dissemination of relevant information to vast numbers of farmers will continue to adversely affect African agriculture, unless there is a major change in attitude to farming. Perhaps the rapid uptake of mobile telephones will enable information to reach the rural areas more quickly and more effectively now!

The new paradigm is whether genetically modified crops can help feed the world. The advent of GM cotton expressing the gene for the toxin of *Bacillus thuringiensis* has already proven to be excellent at controlling bollworms. GM Bt cotton is now grown in many countries and has significantly reduced the need for insecticides to be applied by farmers. Unfortunately, bollworms are only one type of cotton pests and in some case farmers still have to apply insecticides to control sucking pests. In India and Pakistan there are reports of mealy bugs on GM cotton, no doubt after the less expensive organophosphate insecticides were inappropriately applied against whiteflies or other sucking pests. GM crops have so far made little headway in Africa, while governments grapple with the problems of regulation of their use. In Africa, cotton yields were only improved in the 1920s with the breeding of pubescent varieties using genetic material from India to allow plants to survive severe infestations of jassids (*Jacobiasca* spp.). Later, the plant breeders managed to provide varieties resistant to bacterial blight disease, but yields were still low until insecticides were applied against bollworms. It is good that in Burkina Faso, the introduction of the Bollgard II gene is on an African variety with some resistance to jassids. It will be important that any GM cotton is grown in the context of IPM, and that seed will be carefully checked to maintain jassid resistance, and that appropriate sprays will be applied if whiteflies (*Bemisia tabaci*) or cotton stainers (*Dysdercus* spp.) infest the crop.

Clearly, if Africa is to develop it must do more to support the rural population and this means improving both agricultural development and public health, with malaria and other disease causing unnecessary suffering. Technology cannot alone improve production, it will be the recognition that the basic infrastructure is an essential part of improving agricultural productivity and that Governments should put greater emphasis on this. In recognition of the need to improve agricultural production, a Forum for Agricultural Research in Africa (FARA) has been established and is being assisted by funding from the UK Department for International Development (DFID) which is supporting a programme for Strengthening Capacity for Agricultural Research and Development in Africa (SCARDA). These initiatives are very welcome, but must be supported strongly by individual governments to sustain the research and ensure implementation of subsequent results by African farmers.