AFRICAN CENTRE FOR BIOSAFETY

"The Venoms Of Scorpions And Spiders..."[1]

GLOBAL AGRICULTURE AND GENETICALLY MODIFIED COTTON IN AFRICA

By

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for the

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[1] This comes from a quote from the International Cotton Advisory Committee (ICAC) (n.d.:1) which says that apart from the potential of further Bt gene research for future cotton modification, "…venoms of scorpions and spiders have the potential to be used as feeding deterrents".

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EXECUTIVE SUMMARY

This paper offers an analytical overview of the economic, social and political forces driving the introduction of genetically modified cotton in Africa. The first part of the paper contextualises the rise of agricultural biotechnology by framing it within a broader understanding of the role of technology in the growth of modern, industrial agriculture and its increasing globalisation. Proponents of the use of genetic modification in agriculture (GM) compare the potential of GM to the so-called Green Revolution of the mid-twentieth century. In making this comparison, proponents mean to suggest that GM can result in a rapid increase in yields through the use of the latest technological methods. However, there is a vast body of evidence to suggest that the Green Revolution had a wide range of negative effects. These include the environmentally unsustainable use of chemicals, land concentration, growing social inequality, and heightened farmer dependence on external inputs supplied by big corporations that used this dependence to capture value in the commodity chain.

The introduction of hybrid seed destroyed the widespread practice of seed saving for reuse because hybrids lost vigour after one or two years. The growing reliance on hybrids also served to narrow the gene pool and increase uniformity of commercially available seed regardless of locally specific conditions. In Africa's traditional cotton growing regions, colonial imposition marginalised varieties adapted for local conditions resulting from centuries of local breeding. Green Revolution technologies, including 'improved' seed varieties and chemical inputs facilitated the expansion of production for export markets. The capture of seed for profit facilitated the concentration of input supply and the merging of seed, chemical and biotechnology companies. Global expansion supported by dominant state policies converted the world into markets for these increasingly transnational corporations.

The Green Revolution experience suggests that technology cannot be separated from the social, political and economic systems it emerged from. The Green Revolution technology functioned to draw Africa into global economic relationships as a low value-added raw materials supplier based on continuing political subordination and manipulation and destruction of indigenous social systems. The expansion and intensification of cotton production was geared towards meeting the needs of manufacturing in the metropoles rather than local need in the economic peripheries. As with the GM debate today, local needs are reinterpreted by dominant powers to align with dominant global interests i.e. higher incomes through greater productivity. This binds African producers into a social and economic model in which they will forever be producers of primary goods and consumers of processed goods.

Global cotton commodity chains are characterised by some concentration of power in trading and input supply. At the international trading node of the global cotton commodity chain, traders function as holders of stocks and mediators of quality. Nevertheless, the cotton-to-textile chain recedes in power in relation to global clothing-to-retail chains. On the input side, there is also growing concentration amongst seed, agrochemical and biotechnology companies that

transcends the cotton sector. Most cotton producers are price takers, the result of fragmentation amongst producers and the distribution of power in the commodity chain. Cotton prices are at historic lows, caused by a combination of the depressive effects of subsidies in the US, EU and China, and the growth of cheaper synthetic fibres as an alternative to cotton.

African cotton production is modest compared to the output of China, the US, India and Pakistan but since sub-Saharan African producers export most of their production, especially at the West African centre of cotton production, Africa is one of the largest exporters. China, India and Pakistan consume most of their own produce. Africa and Uzbekistan produce for export, and the US uses about half its own produce and exports the rest based on subsidies. More than 10 million people in Africa rely on cotton production as their main source of income. Smallholders are the main producers of cotton in Africa. This is in contrast to the United States where large-scale agribusinesses dominate production. The volume of production in the US and China means that domestic policies in these two countries have ripple effects throughout the global industry. One example of this is the shift in stockholding policies in the US and then China in the 1980s that caused a sharp decline in prices as stocks flooded the market. Another example is the high levels of domestic subsidy, especially in the US, that permits domestic producers to export competitively even though the cost structure of production is higher than other parts of the world, including Africa.

Africa as a whole is the third largest cotton exporting region in the world behind the US and Uzbekistan. Egypt is the continent's biggest producer but converts most of it domestically. Four West African countries (Mali, Cote d'Ivoire, Benin and Burkina Faso) dominate exports, followed by Zimbabwe. Cotton has also historically been produced in East Africa, and these are targets for the introduction of GM cotton. Apart from the broader ideological justifications for introducing GM cotton, such as increasing productivity and reducing poverty, the technology is seen to be an adequate answer to the problems caused by Green Revolution technologies. In particular GM cotton is presented as an answer to the environmental damage caused by, and rising resistance to, pesticides. While in Africa other pest management techniques have been implemented with success, these have remained isolated in the face of an attack on state-provided services and limited political will.

The rapid growth in the adoption of GM cotton across the world is used to argue that Africa will miss out on this 'second Green Revolution' if it does not immediately adopt the technology. South Africa has been the only African country so far to allow the commercial planting of GM cotton, but field trials are under way in Egypt, Mali and Burkina Faso. South Africa is used as an example of the benefits of GM cotton for African smallholders, despite the fact that only 5% of GM cotton is grown by smallholders in South Africa. The apparent successes of the technology amongst African smallholders in South Africa are premised on concentrated institutional, financial and technical support that is unlikely to be replicated in many places.

Globally, the claimed successes of GM cotton are contested. The apparent benefit of Bt cotton is that farmers save money by spraying less insecticide because the insecticide is built in to the genetic structure of the seed. An additional spin-off is the reduction in environmental damage.

However, the pests targeted by Bt cotton are only a few amongst many pests that damage cotton plants. In Africa, broad-spectrum insecticides are used that target all pests including those targeted by the Bt toxin. This means these pesticides will not be used any less as a result of the use of Bt cotton. Pests also develop resistance to insecticides, including Bt and therefore additional pest management techniques will still be required. There is also growing evidence to suggest that Bt cotton is more susceptible to secondary pests, necessitating additional pesticide use to control these pests. In the US, although insecticide use for pests targeted by Bt has declined since the introduction of Bt cotton, overall insecticide use has not declined because of the growth of secondary pests.

The introduction of transgenic crops cannot be separated from the perceived role of agriculture as a driver of market and private sector-led development in Africa. USAID defines its agenda in African agriculture as being to improve productivity and incomes for African farmers. Yet rising cotton productivity in current conditions will merely result in even lower prices. Primary producers are also not in a position to capture a greater share of value in the context of an uneven distribution of power in the commodity chain. Dominant states have played a key role in maintaining and extending the uneven distribution of power through the continuing provision of subsidies, facilitating and enforcing skewed trade liberalisation, privatisation and deregulation policies, framing and enforcing one-sided intellectual property rights protections based on patents as a feature of their own legal systems, and facilitated the expansion of the private sector in agricultural research and the formulation of biosafety laws.

The US, EU and Chinese governments pay producers massive subsidies to continue production, even though these cost the state more than the total value of production. In the US and the EU, large-scale agribusinesses are the primary beneficiaries of state subsidies. These subsidies permit producers to adopt more expensive technology such as GM cotton and its associated chemicals and still sell their cotton on the world market cheaper than unsubsidised producers in other parts of the world including in Africa. The subsidies can only be understood in conjunction with trade liberalisation because the World Trade Organisation (WTO) determines the legality of subsidies. Although the WTO recently ruled against US cotton subsidies, the 2004 'July framework' that aims to restart global negotiations around trade in agriculture permits the Us and EU to continue to manipulate the various categories of support. Both the US and the EU have indicated their intentions to reorganise their subsidy systems to comply with WTO regulations while not substantively reducing the subsidies.

Other aspects of the trade liberalisation agenda include a continued reduction in domestic support in developing countries through bilateral agreements rather than the WTO, and trade preferences being made conditional on continuing liberalisation of agricultural markets, including cotton. International cotton traders and processors are supported through foreign policy interventions that impose skewed trade liberalisation, deregulation and privatisation policies through multilateral institutions like the WTO, the World Bank and the International Monetary Fund (IMF). Across the African continent, cotton industries have undergone a remarkably similar process of withdrawal of state support and privatisation of processing and exporting in

particular, regardless of country specific conditions. The growing privatisation of plant breeding and seed supply, agricultural research and development, and the provision of essential services characterise every national cotton-producing sector on the continent. The results of privatisation have stimulated cotton production in some countries and increased the involvement of TNCs in most. But a number of essential services formerly provided by vertically integrated parastatals, including extension, the provision of credit and quality control, have generally failed in the era of privatisation and deregulation.

Coupled with conditionalities that have encouraged or enforced privatisation and deregulation policies onto cotton systems in Africa, dominant states have also played a key role in enforcing intellectual property rights protection before technology is transferred. However, the intellectual work of countless generations of farmers and plant breeders in improving varieties is marginalised in favour of intellectual property rights based on patents registered in the dominant capitalist countries, in particular the US, the EU and Japan. The protection of patents requires a reorganisation of legal and political systems to align with private property rights and their monitoring and enforcement.

Legally enforceable contracts between input suppliers and cotton producers are one of the legal mechanisms for the protection of right to profit form the intellectual property captured in genetically modified seed. Contracts stipulate the payment of technology fees for the use of the seed over and above the normal cost of the seed, and bind the producer to exclusive use of chemicals produced by the same company.

The privatisation of agricultural research, supported by the actions of dominant states, has seen Africa's agricultural research institutions becoming subordinated to the private interests of biotechnology companies. USAID together with the largest TNCs in the seed-biotech-chemical sector are setting the research agenda by providing funding in the context of withdrawal of national state support for agricultural research. Their express intention is to produce commercially viable biotechnology products under the ownership of the TNCs. The US in particular assists biotechnology and seed companies to undermine or water down multilateral environmental agreements that seek to limit their spheres of operation. The United States government and biotech companies are driving an alternative process based on the formulation of national biosafety laws that aim to shift the focus away from biosafety and towards capacity building in biotechnology. The dominant states help to construct regulatory and legal systems that protect corporate property rights and favour their insertion into new areas of operation. In the case of cotton, this is both to introduce their products (including seed) and to access commercially untapped genetic resources for future product development.

Given this multi-pronged attack on African cotton systems, it is recommended that African producers and governments reject the introduction of GM cotton, and the utilisation of existing agricultural infrastructure and institutions for the insertion of GM cotton into their systems. Far more sustainable alternatives to GM cotton exist. Pest management techniques that rely on increasing producers' knowledge and integrating farmers' own knowledge with environmentally sustainable best practices from elsewhere are preferable to the introduction of technology that

draws pest management away from control of the direct producer. Poverty reduction is more feasible if based on the redistribution of existing resources, including secure access to land, water and locally available genetic material than if based on a single technology reliant on a vast array of external inputs only made available on the basis of payment. Instead of privatising agricultural institutions and focusing on biotechnology that places control in the hands of distant experts, research and development could become more participatory, allowing producers to determine their own needs whether for the global market or not. In particular, dedicated support for the production of food and fibre for local need first and only then for exchange should be encouraged. At the end of the day, primary producers, farm workers and the landless need to organise themselves to press for their own demands. A rejection of the imposition of GM crops and the associated restructuring is imperative in this regard.

INTRODUCTION

There is a strong push to spread the commercial planting of genetically modified (GM or transgenic) cotton into Africa's core cotton growing regions. Yet the language of poverty reduction and humanitarianism that is used to justify this is a thinly veiled disguise for the global expansion of transnational corporate interests. There are many reasons to be wary of the introduction of genetically modified organisms into agriculture. These include environmental and health concerns, lack of certainty about economic benefits, ethical and even spiritual concerns, and issues related to the use of technology for sectional interests. This paper will focus on the socio-economic and political implications of the introduction of this technology. Historical precedent, and an understanding of existing social structures and the uneven power relations underpinning them cannot be ignored in this discussion.

Under capitalism, investment only has value if profits are realised at some point. This means that there is a drive to realise profits on past investments in technological research and development (R&D), regardless of long-term or hidden social, political, economic, environmental or other costs that might be incurred by some sections of society. Smallholder African cotton producers, generally resource poor and lacking in adequate support, are now the targets for profit making. Building on the social devastation left by colonialism and still all too apparent across Africa, the introduction of GM crops seeks to restructure political, social and economic systems yet further to the primary benefit of corporate activity. Nation states play an important role in facilitating these processes of technology-driven development and economic concentration by maintaining and restructuring regulatory frameworks as required. The challenge for Africa is not only how to resist this imposition, but also how the African populace can reassert control over political and economic processes that unfold in its name but seldom to its benefit.

INDUSTRIAL AGRICULTURE AND BIOTECHNOLOGY

> *"Industrialisation is the process by which production (is) restructured under pressure of increasing levels of capital and technology"*
>
> Thomas Urban, former President and Chair of Pioneer Hi-Bred, 1990
> (quoted in Kneen 1995:193)

Proponents of the use of genetically modified organisms in agriculture argue that the technology will have an even bigger impact on agricultural production than the technology of the Green Revolution in the 1960s and 1970s (see for example Conway 1997; US Agriculture Secretary Ann Veneman cited in ENS 2004). To understand the comparison it is necessary to understand what the Green Revolution was and what it achieved. The Green Revolution was the transfer of technology to Third World agriculture, in particular high yielding seed varieties and the associated irrigation and chemical inputs they required for success. The technology was underpinned by mass production of uniform seed and chemical inputs that occurred under the control of Northern countries and was brought to producers in the South as part of a package of

aid and development assistance. It is possible to refer to this as industrial agriculture because agricultural production in this model became entirely dependent on industrially produced inputs to sustain itself. The industrialising model of agriculture was driven by technology developed during the 2nd World War. The war economy relied almost entirely on heavy industry. After the war, it was heavy industry that drove the rapid economic expansion not only in the most advanced capitalist countries but also on the peripheries. Mining, oil, heavy machinery, chemicals and their associated scientific offspring dominated. In agriculture, the synthesizing of chemicals from plants opened another path into agriculture for the petroleum industry (Fowler & Mooney 1996:128). Mechanisation and oil-based inputs (fertilisers, insecticides, herbicides) became the engine for a rapid rise in farm productivity[3].

The emergence of hybrid seed was partially a response to this, to make full use of the new technology. It was also partly a cause, because the development of hybrids generated the need for increased chemical inputs (Fowler & Mooney 1990:130). Hybrid seed and other plant and animal improvements emerged from the new science of genetics at around the same time. Seed companies saw opportunities for profit because hybrid seed produced vigorous plants for only one year. Farmers would be unable to produce their own seed, and would have to return to the vendor each year (Danbom 1995:235). In this instance, there was a direct relationship between the generation of private profits and the destruction of economic and social systems of seed saving. This was a crucial step in loss of control by the direct producer in the agricultural production process in the US. The growing reliance on hybrids also served to narrow the gene pool and increase uniformity of commercially available seed regardless of locally specific conditions, to the extent that a US Academy of Sciences report concluded that US agriculture was 'impressively uniform genetically and impressively vulnerable' (cited in fowler & Mooney 1990:83). As early as 1972, three major cotton varieties accounted for 53% of crop acreage in US agriculture (Fowler & Mooney 1990:83). Even though Africa was slow to adopt the new hybrids, more than 50% of cereal lands in sub-Saharan Africa were under Green Revolution varieties by the early 1980s (Conway 1997:58).

In West Africa, the rapid growth of cotton production in the 1960s and 1970s would not have been possible without the use of Green Revolution technologies including fertilisers and pesticides (Elbehri & MacDonald, forthcoming:9). Bollworm and budworm are two insects that destroy cotton. Chemical use in pest control has been at the core of cotton production since insecticides became widely available after the 2nd World War (Elbehri & MacDonald, forthcoming:6-7). UN Food and Agriculture Organisation (FAO) (2004:5) estimates that cotton production consumes a quarter of all agricultural pesticides used worldwide. In the mid-1990s, US cotton growers purchased an annual US$350m in fertilisers and US$600m in agricultural chemicals (Kneen 1995:169). In Africa, the cotton share of total pesticides is amongst the highest in the world, reaching 80% or more in some cases (Elbehri & MacDonald, forthcoming:7). The first pesticides on the market to combat these insects on an industrial scale were chlorinated

[3] It is interesting to note that the oil industry also lies behind one of cotton's key competitors in the fibre market, the synthetic polymers (polyester, acrylic and nylon) derived from crude oil. Despite the apparent shift from an industrial to a knowledge economy in recent decades, the oil industry remains pervasive.

hydrocarbons such as DDT, which were used until the 1960s when they were banned for being unsafe. Organophosphates and pyrethroids were used for a while, but pests developed resistance to them over time, and organophosphates in particular were very unsafe and environmentally damaging (Biowatch South Africa 2003:3).

The negative fallout of the global distribution of pesticides under the Green Revolution is being felt by Africa today. In the second half of 2004 the World Bank African Stockpiles Programme was set up to destroy banned, contaminated and expired pesticides in Africa over a period of 15 years. The initial phase will include Ethiopia, Mali, Morocco, Nigeria, South Africa, Tanzania and Tunisia (Cartier 2004). According to World Bank environment specialist Steve Maber, "most of Africa's pesticides are government-owned and acquired as part of aid packages" (quoted in Cartier 2004). This indicates the inappropriateness of technology provided by the Green Revolution. As the pace of technological change speeds up, technologies more quickly become obsolete. When these are chemical or biological technologies, they may become highly dangerous for human beings. Many have, like DDT and other now-banned pesticides. This is a fundamental problem with the way the technology was introduced. Technology is encoded into society like the Bt gene is incoded into the cotton germplasm. With pesticides the negative effects were not anticipated until the chemicals were already irreversibly in the environment causing noticeable damage.

The introduction of the technology could not fail to transform the character of production where it was adopted. It favoured those with resources to access the whole package of new technologies, and where infrastructure was able to deliver inputs in the right amounts at the right times. Gordon Conway (1997:62), an ardent proponent of the Green Revolution says that success was at least partly based on implementation by "those classes of farmers with the best expectations of realizing the potential yields". Without doubt, potential yields could only be realised where farmers could buy the necessary fertilisers and other chemicals, construct and maintain irrigation systems, had adequate land to benefit from economies of scale, had access to credit, and were able to obtain and apply the necessary inputs at the right times. The result has been a rapid increase in inequality of income and asset distribution, and the worsening of absolute poverty in these areas (Niazi 2004:245; Bowring 2003:130).

Many farmers, especially those without sufficient resources of their own to buy into the technology, were marginalised and even forced off the land. The concentration of lands to capture economies of scale led to evictions of tenants and others with insecure tenure (Conway 1997:79; Niazi 2004:250-52). Machinery for chemical applications, irrigation and harvesting displaced labour, and pushed farm workers off the land (George 1977:120; Perelman 1976:113). Many were converted into landless rural workers, although in some places this was offset by the growth of urban economies that absorbed surplus rural workers. Not all farmers who adopted the technology always benefited. For small farmers inputs are more expensive per unit because of the higher transaction costs of packaging and delivering in smaller quantities (Conway 1997:69). High outlays on tractors and other machinery, higher priced seeds, chemicals and other inputs made farmers dependent on input providers (George 1976:113-132). There was a

reduction of control over production decisions by farmers in favour of control by corporations/'integrating firms' (Heffernan 1999:3).

Africa's limited adoption of this technology is in large part a result of potential profitability, lack of institutions, technical capability or resources for this end. The last three are dependent on the former. Where there is potential profit, there are resources. But there was also an element of refusal in Africa's adoption of the technology. Although the technologies were available, they were unpopular and ineffective in most cases. This is partly a result of conditions that are unsuitable to intensive monoculture production because of insufficient or excessive rains, high incidence of diseases and pests and other factors (Kuyek 2002:2). This also proves to be a problem for the introduction of transgenic organisms (Kalibwani et al. 2004:22).

The Green Revolution contributed to the growth of multinational agribusinesses, either in input supply, production and processing, distribution or buying and selling. Where it was possible and profits could be made, there was vertical integration between some of these parts. Sometimes production was also included in the integrated chain, often on the basis of contracting out to external producers. Corporations could lease land for production rather than buy it, an important consideration in the period immediately following decolonisation when nationalisation was a living doctrine. It meant less risk and greater mobility for multinational capital.

In agriculture, transnational activity in input supply rose alongside the rise of vertically integrated producer-processors and traders. This activity was concentrated in the spheres of seed, chemicals and biotechnology, where synergies were becoming apparent. In the 1980s, the agrochemical companies also engaging in biotechnology research began to acquire seed companies, believing that seed is the primary delivery system for biotechnologies (Sasson 2000:3). Two chemical and seed companies, Dow and Du Pont, have major interests both in biotechnology and also in the 'new wave' of nanotechnology (in theory, constructing matter from the atom up) (ETC Group 2003). Most of the big agro-biotech companies have for years been in the agro-chemicals business, including Bayer, Monsanto and Dow. Monsanto's Roundup herbicide commands 90% of the herbicide market, and the company also controls over 90% of the market for biotech seeds (Barboza 2003). Syngenta, a merger of the agrochemical businesses of Novartis and AstraZeneca in 2000, became the largest agrochemical company in the world and the third largest seed company (RAFI 2000:9). Concentration in the seed industry has intensified dramatically in the 1990s, at the same time as a sharp increase in mergers and acquisitions between seed companies and biotechnology companies. In the mid-1980s, FAO estimated there were 7 000 commercial seed sources worldwide. By 1998, this had fallen to 1 500, with 24 accounting for over half the commercial seed market (Consumer International 2003:10)[4].

[4] It's useful to get a sense of the scale of some of the corporations to relativise the importance of the agro-industrial complex. The world's largest pharmaceutical company, Pfizer/Pharmacia, earned more than the top 10 corporations in each of the each the biotechnology, seed and agrochemical sectors combined in 2002. In turn the world's largest retailer, Wal-Mart, earned more than 6 times as much as Pfizer/Pharmacia in the same year. Despite Monsanto's dominance in the seed and agrochemical sectors, the corporation earned a trifling US$4688m compared to Wal-Mart's US$246 525m (See ETC Group 2003:4 & 9).

OVERVIEW OF THE COTTON SECTOR

Africa is on the threshold of the introduction of transgenic cotton. In order to fully understand the possible implications of this development, it is useful to have an understanding of the structure of power in the global cotton industry. A global commodity chain analysis permits us to locate power along the chain and get an understanding of the forces driving technology development; the way value is determined and future requirements in the chain. Placing African production in the global context allows its relative importance to become clear. Differentiation of production in Africa and the significance of cotton in regional and national economies on the continent provide an indicator of where likely attempts will be made to introduce transgenic cotton. This section provides some information in each of these areas and highlights the importance of transgenic cotton in this structure.

INTEGRATION AND CONCENTRATION IN THE GLOBAL VALUE CHAIN

Cotton supply and demand are both extremely fragmented and a single locus of market power is not easily discernible in the cotton commodity chain (Raikes & Gibbon 2000:67). Although there is concentration in particular nodes of the chain such as input supply or trading, none of these nodes exercises dominant power across the entire chain that would permit actors in that node to determine decisions made by actors in other nodes of the chain. Having said that, traders do exert greater influence on chain functioning, decision-making and the distribution of value in the cotton-to-textile chain. Clothing is another matter, with branded manufacturers and retailers exerting the greatest dominance.

Plant breeding is a concentrated stage of the seed industry, but production and distribution of certified seed is carried out by hundreds of companies (USDA ERS 2002:30). Until the early 1980s commercial cotton planters cleaned and separated out saved seed, but this became less economical especially as developments in cotton breeding brought new improved hybrid varieties. The reduction in seed saving was also related to the growing enforcement of plant breeders' rights and the introduction of Bt cotton in 1996 with contracts prohibiting growers from saving or sharing seed. This led to a growth in purchased seed in the US from 50% to 75% between 1982 and 1997 (USDA ERS 2002:36). The result is the conversion of farmers from producers of seed to consumers of seed (Leahy 2004).

Accompanying this growth, large private firms rapidly replaced smaller firms and public institutions as suppliers of seed varieties (USDA ERS 2002:36). In 1999, Delta & Pine Land had a 76% share of the US cottonseed market, followed by Stoneville with 13% (USDA ERS 2002:37). In 2000, Delta & Pine Land was the world's largest cottonseed company (RAFI 2000:3). Monsanto tried to buy Delta & Pine Land in 1999 but called the merger off, and it did acquire Stoneville in 1997 only to sell it again in 1999 (USDA ERS 2002:39). A number of biotechnology companies are involved in the development of GM cottonseed, including Monsanto, Syngenta and Dow AgroSciences. They hold the patents on GM seed and licence the

technology to other companies to use, receiving royalties in exchange for its use. Delta & Pine Land, for example, uses and distributes Monsanto's technology although not holding the patents for it.

There are two types of GM cotton. Bt cotton utilises an insect toxin-producing gene from Bacillus thuringiensis (Bt), a naturally occurring soil bacterium that has been used as a biological pesticide by farmers for many years. Inserted into the cotton plant, the gene stimulates production of toxins in the plant that result in a lower requirement for certain pesticides. Herbicide tolerant cotton is genetically modified to resist the herbicide glyphosate (Roundup Ready, in the case of Monsanto's seed) that would otherwise kill the cotton plant along with weeds. Stacked varieties that combine both traits together in one plant have also been introduced. Future trends in GM cotton research include further input traits, especially the use of other Bt genes that can be used in cotton for other types of insects, and output traits such as modifying for cotton length and colour (ICAC n.d.).

There do not appear to be strong formal links between input suppliers and buyers of cotton as a raw material for processing. This is partly because input suppliers are horizontally diversified, with their core business being chemicals, seed and biotechnology. Vertical integration in cotton is very different from grain. In grain, processing is limited to milling. In cotton, the bulk of the product has a far longer chain of value addition and other large horizontally integrated interests dominate many of the nodes. For example, WalMart as a major retailer of clothing made from cotton has unassailable power in that node against a company climbing the cotton chain from origins as an agricultural input supplier. Nevertheless, biotech seed companies and traders have mutual interests in the extension of transgenic crop production, as evidenced by Cargill's and a number of biotech seed corporations'[5] joint sponsorship of the International Service for the Acquisition of Agri-Biotech Applications (ISAAA) (Greenpeace 2002:7). Another example is Phytogen Seed Company's 1998 acquisition of a cottonseed breeding programme in Argentina. Phytogen is a joint venture between Mycogen Corporation, owned by seed and input supplier Dow AgroSciences, and J.G. Boswell, the world's largest producer of cotton fibre. The goal is to give Phytogen a significant presence in cotton production in Argentina, specifically to produce high quality fibre for the high value Californian market (Mycogen 1998). In many countries, there is a history of tight co-operation between plant breeding and the larger colonial or national cotton industries. But so far this has not translated into vertically integrated firms (Devlin Kuyek, pers comm., 5 Oct 2004).

In most parts of the world, cotton in produced by smallholders rather than on large-scale industrial farms. For example, an estimated 2 million households in West and central Africa and another one million households in the four biggest cotton producing countries in East and Southern Africa earn most of their income from cotton production (Gillson et al 2004:59). Amongst these producers, cotton is intercropped with food crops for subsistence and sale. In many places, inputs such as fertiliser, chemicals and credit can only be accessed if cotton is

[5] Including Monsanto, Bayer CropScience, Pioneer Hi-Bred, Syngenta, Cargill, Dow AgroSciences, KWS and the USDA.

produced, and producers share these with other crops (World Bank 2003:2). This smallholder structure of production means producers are fragmented and are consequently forced to be price-takers. For one thing this means they cannot pass increases in input costs down the chain. Producers are generally squeezed between rising input costs and stagnant or declining producer prices.

Cotton prices on the global market are based on the Cotlook A- Index[6].There is a stratified pricing system based on quality standards that were established by the USDA and later globalised. Cotton prices fell to historic lows in 2002 at US$1.02/kg in that year (Baffes 2004:63). High quality cottons from Egypt, the US and parts of Asia command a premium of 20-50% or more above the index price, and US and Australian high-medium grades command a premium of 10% or more. Higher prices are also paid for cotton that appears at times of low supply of new cotton (Gibbon 2000:16). West and central African cotton lint is generally of a high-medium or medium quality, and commands an average 9.3% premium above the A Index. Part of the premium derives from a very low count of knotted and short fibre content, and low levels of contamination (Gillson et al. 2004:12). Producers can only choose the type of cotton they want to grow within ecologically determined limits. Long staple extra fine cotton receives its premium precisely because it cannot be produced everywhere.

Cotton prices have been on a downward trend since the mid-20th century as a result of greater output and competition from synthetic alternatives. Policy changes that saw the US reduce its stocks in the mid 1980s with China doing so in the late 1980s also saw precipitous drops in global prices. However, especially from the 1980s government subsidies to producers in three of the largest production areas (the US, China and the EU) have also directly caused depressed prices (see section on subsidies below for details).

In contrast to the wide base of smallholders in Africa and Asia, production in the US is increasingly concentrated amongst large-scale producers. The cotton industry in the US has undergone significant consolidation into bigger production units under the impact of the domestic subsidy framework. The number of cotton farms dropped from 43000 in 1987 to 31500 in 1997, and the average size more than doubled in the same period. Farms over 500 acres increased their share of total US production from less than half to 71% over the decade (Meyer & MacDonald 2001:2). As smaller farms have gone to the wall, agribusinesses have consolidated their interests through a combination of acquisitions and government subsidies. There is a close relationship between growers and ginners because cotton lint rather than raw cotton is the product that is sold on international markets. In many cases, there is integration at the growing/ginning node of the chain. Some of the largest cotton agribusiness in the world are integrated at this level as well as into trading, including Allenburg Cotton Company (owned by Louis Dreyfus), Dunavant Enterprises (private) and Hohenburg Brothers (owned by Cargill).

[6] The Index is a principal measure of international cotton prices based on the average of the five lowest quotes of cotton for delivery to Northern Europe ports. In 2000, quotes for Pakistani, Syrian, Uzbekistan, Greek, and Franc Zone African cotton were included in the Index (USDA Foreign Agricultural Service 2001:1).

Cotton merchants or traders play an important role in the global industry to the extent that Gibbon (2000) considers the cotton commodity chain to be trader-driven (as opposed to being driven by buyers or producers). International traders hold most stocks, allowing just-in-time delivery and reliable supply of standardised qualities to individual processors (Larsen 2001:17). This is increasingly the case as spinners are outsourcing storage functions to traders, who are managing the risk by hedging on futures markets (Gillson et al. 2004:6). Traders buy and sell, organise transport and offer price-hedging services. Very often they are vertically integrated, supplying credit, inputs, agronomic information and market news to producers, gin cotton, and market both seed and lint (ICAC 1994:7). In 1994, the 15 largest cotton-trading organisations (state, private and co-operative) handled slightly more than half of world production (ICAC 1994:7) Raikes and Gibbon (2000:67) estimate that the ten largest northern hemisphere private or co-operative trading groups account for 30-40% of world trade, perhaps making trading the point of greatest concentration in the chain. Other figures indicate that the 19 largest trading companies handled 39% of world production in 2000 (Gillson et al. 2004:6). There seems to be some evidence of concentration in export functions between international buyers, exporters, processors and internal traders (Shepherd & Farolfi 1999:66).

According to Gibbon (2000:16) while there is some vertical integration between direct producers and international traders, there is none between spinners and international traders. With the development of ever more detailed systems of fibre classification, there is a growing trend towards contracting between producers/ginners and spinners without the aid of traders. This direct relationship allows spinners to request very specific qualities from producers/ginners (Gillson et al. 2004:13).

Spinners convert lint into thread used to manufacture textiles. Spinners are mainly located in countries were cotton will be converted into textiles or clothing. Cottonseed left after cotton has been baled is used in animal feed, and to make cottonseed oil that goes in to a variety of foodstuffs. Cottonseed oil is stable at high temperatures, and is used in foodstuffs for flash frying of products such as pre-cooked batter-coated foods (Biowatch South Africa 2003:41).

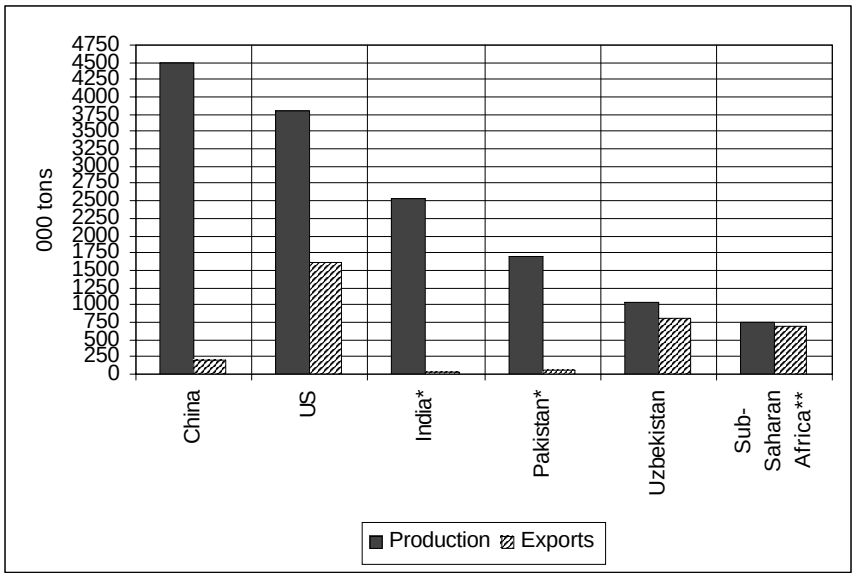
The 1990s have seen a gradual rise in the production of textiles derived from cotton in Africa, but this is entirely insignificant on a global level with Asia and Western Europe dominating the production and trading of textiles and clothing (Gereffi 1999:64). Conditions in West Africa are not favourable for converting fibre into textiles in the face of subsidised dumping and the importing of used clothes because weaving has a high capital/labour ratio and it relies heavily on electricity, which is expensive in the region (Goreux 2004:21). A strategy of adopting targeted tariffs to limit dumping and encourage domestic industry, coupled with a focus on small scale production to meet domestic textile demand would require a shift from an export orientation in cotton production. Such a strategy would also have important implications for the introduction of transgenic cotton varieties into West Africa. Rather than requiring the adoption of transgenic technology, it would encourage the adoption of local varieties better adapted to local conditions that could provide for uniqueness in local textile production (Devlin Kuyek, pers comm., 5 Oct 2004).

The 1995 WTO Agreement on Textiles and Clothing aims to eliminate import quotas on textiles at the start of 2005 and importing countries will no longer be able to discriminate between exporters. This may result in the relocation of textile processing facilities from developed to low cost developing countries (Baffes 2004:17). Most of the value added in global textile and apparel chains is appropriated at the downstream end of the chain including retail, branded marketing and branded manufacturing (Gereffi 1999:47-48). Given high barriers to entry into these sections of the chain, it appears that Africa will remain locked into low value-added primary production and processing as long as cotton producers orient towards global markets.

THE GLOBAL COTTON SECTOR

China, the United States, India and Pakistan account for two-thirds of global cotton production (Watkins & Su 2002:9). In most years, exports account for a larger proportion of the crop than domestic use in the US, while in the other three major producing countries, most cotton produced domestically is also consumed domestically. Subsidies play a large role in the dominance of US in the export market (see section on subsidies below). Mainland China is the largest producer in the world, but is also the largest consumer and is a net importer of cotton (ICAC 2004a:3). Between them, China, India, the United States and Turkey account for three quarters of global cotton consumption (Baffes 2004:2). Much of this is produced domestically. The textile industries of East Asia make the region a cotton importer of growing significance.

Figure 1: Cotton production and exports – selected countries (5 year average 1998-2002)



Source: Baffes 2004:58; ICAC 2004:3 for China export data
**Figures for exports from India and Pakistan not available for 4 years because negligible*
***Sub-Saharan Africa figures based on data from the 5 largest exporters (Mali, Cote d'Ivoire, Benin, Burkina Faso and Zimbabwe)*

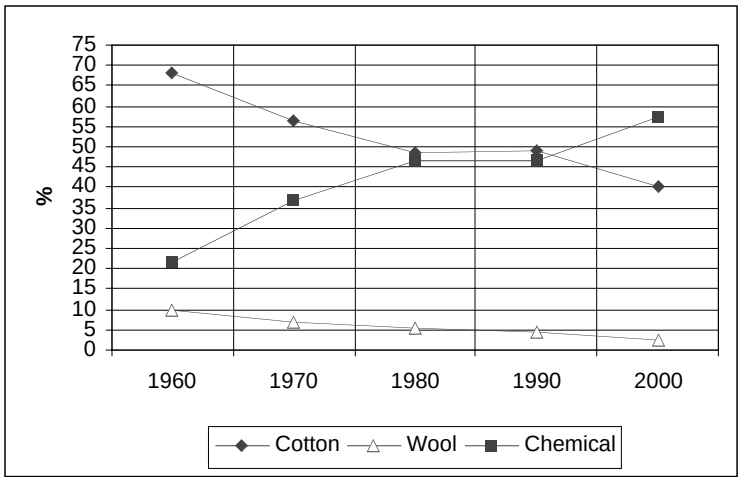
As figure 1 above reveals, there is great variation in domestic consumption of cotton production from one country to the next. While China, India and Pakistan consume most of their own production, Africa (and especially the centre of production in West Africa) and Uzbekistan

produce mainly for export. About one third of cotton production in traded internationally (Baffes 2004:v).

The global market for cotton is characterised by slow demand growth, rapid productivity growth, new entrants into the market, downward price trends, and price volatility (WTO 2004:3). Important factors in the state of the global market include a decline of cotton as a share of total fibre consumption relative to synthetic chemical fibres in textiles and clothing, and new technologies including a rapid increase in the planting of transgenic varieties.

As figure 2 below indicates, the share of cotton in global fibre production has decreased in almost precisely inverse proportion to the rise in the share of chemical fibres in the market. The importance of this is that cotton is following other traditional agricultural exports from the South into decline in relation to industrially manufactured commodities mainly generated in the North.

Figure 2: Percentage share of global fibre consumption 1960-2000



Source: Baffes 2004:65

COTTON PRODUCTION IN AFRICA

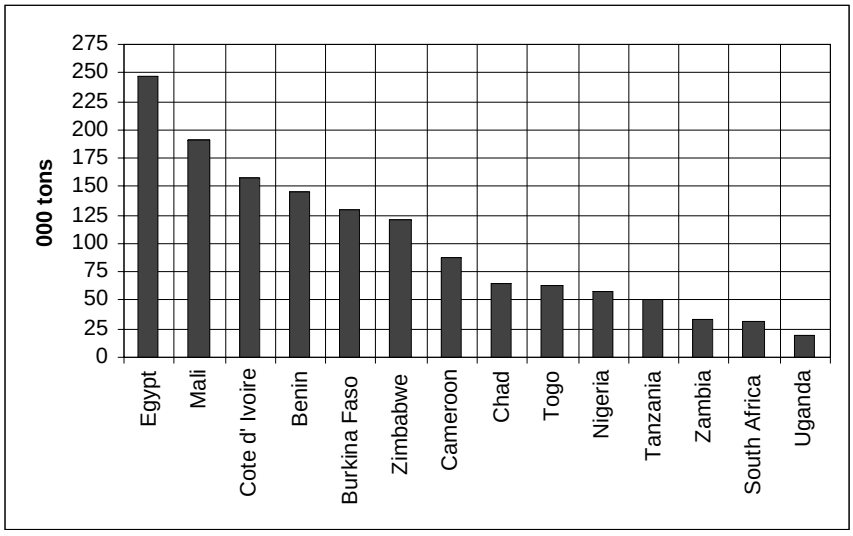
Cotton and handicraft cotton textile production were part of African economies, in particular in West Africa, long before the arrival of colonists (Roberts 1996; Bassett 2001). The first domesticated African cotton varieties originated in Africa and crossed with Asian varieties long before the rise of ancient Egypt (Bassett 2001:31). The industrialisation of the textile industry in Europe from the end of the 18th century resulted in a rapid rise in demand for raw cotton. At the start of the 19th century the US began to dominate British imports, based as the production process was on slave labour. The civil war in the middle of the century forced importers to look elsewhere for raw materials. The French industry turned to its West African colonies in the hope of capturing the supply of cotton and diverting it to exports. This was not as easy as it seemed, because African producers were already cultivating for lively domestic and regional markets (Roberts 1996:45-51). Contestation between an increasingly differentiated peasantry and a

colonial state, itself riven with contradictions and differences in opinion about how best to capture cotton production, prevented a smooth process of reorientation to serve export markets (Bassett 2001:6-7). It was only after decolonisation that cotton really became a notable export cash crop, especially in the Francophone countries of West Africa.

Cotton production in West Africa took off from the early 1960s as an export crop, with production of seed cotton rising from 30 000 tons in 1960 to 1.9m tons in 2002 with 95% of lint produced in the region exported (Riboux 2002:2). Sub-Saharan Africa as a whole recorded a 175% increase in cotton production between 1993 and 1998 (Watkins & Sul 2002:9). In West Africa, the French Company for the Development of Textile Fibres (CFDT, Compagnie francaise pour le developpement des fibres textiles) operated with the newly independent states to create a vertically integrated research-production-marketing structure. It supplied inputs of high yielding varieties, pesticides and fertilisers, purchased cotton and paid producers in a timely manner. This contrasted with the poorer performance of Anglophone Africa (Bassett 2001:1). This has resulted in West Africa dominating cotton production in sub-Saharan Africa.

A fairly broad estimate is that in 2002 Africa contributed around 8-10% of global production and around 15-18% of global exports[7]. Cotton is produced in thirty African countries, of which the most significant are Egypt in North Africa and Mali, Cote d' Ivoire, Benin and Burkina Faso in West Africa[8].

Figure 3: Cotton production in selected African countries (5 year average, 1998/99-2002/03)



Source: Data from Baffes 2004:59, 71, 72

[7] The available data is incomplete, but these figures are based on 2002 estimates from Baffes (2004:59 & 60) with an extrapolation made from country-by-country export shares for 1998-99, but also taking into account the uncharacteristically small US output in that year.

[8] Other cotton producing African countries are Angola, Cameroon, Central African Republic, Chad, Dem Republic of Congo, Ethiopia, Ghana, Guinea, Kenya, Madagascar, Malawi, Morocco, Mozambique, Niger, Nigeria, Senegal, Somalia, South Africa, Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia and Zimbabwe (WTO 2004)

Between them, these five countries produce just under two-thirds of Africa's total production. Egypt uses most of its own production domestically, while the West African countries produce mainly for export. In the 1980s, cotton exports from Africa rose dramatically although from a low base. The overwhelming majority of African cotton is exported as lint i.e. after the first step of separating seed and fibre (Raikes & Gibbon 2000:66).

West and central Africa is the most important cotton-producing region in Africa, accounting for around 60% of Africa's production. The four biggest producers - Mali, Cote d'Ivoire, Benin and Burkina Faso - accounted for 54% of Africa's cotton exports in 1998/99 (Baffes 2004:58). The region contributes around 5% of total world production, making it the sixth largest region of production (Levin 2000). However, 90-95% of total production from the region is exported, making West African countries the third largest exporters behind the US and Uzbekistan (ICAC 2004a:3). West African exports represent around 14% of world trade (Levin 2000). The gap in exports is also narrowing between the region and the second largest exporter, Uzbekistan (Levin 2000).

Cotton exports are very important for the economy in West Africa. Cotton accounts for approximately 40% of all merchandise export earnings in Benin and Burkina Faso, and 30% in Chad and Mali. It has been estimated that more than 10 million livelihoods are dependent on the cotton industry in West and central Africa, with cotton being a typical, and often dominant, smallholder cash crop (Baffes 2004:v). Despite being amongst the cheapest cotton producers in the world, subsidies have skewed the market to the extent that West and central African producers only received 60% of their costs, and prices have dropped 31% despite a 14% increase in yields in recent times (Golokai 2003).

In North Africa, Egypt is the largest single cotton producer on the continent. However, domestic consumption accounts for more than half of production and the country does not export much raw cotton (Baffes 2004:58). Egypt has a strong spinning and weaving industry, and produces high quality fabrics from long staple extra fine cotton fibre. Other North African countries producing cotton are Morocco and Tunisia.

In East Africa cotton was an important crop before the 1970s. However, since then cotton has declined as a share of production. Uganda, Ethiopia, Kenya, Somalia and Sudan all produce some cotton. Since liberalisation, cotton production in the region has shifted to a low-input basis and export strategies target the 'market window' when there is a limited supply of new cotton onto the market from other parts of the world (Gibbon 2000:16).

Zimbabwe and, following some way behind, Tanzania are the largest cotton producers in Southern Africa. Zimbabwe is the sixth largest cotton producer in Africa, and exports a significant share of the crop. Cotton production in Zambia has grown quite significantly since 1995, while South Africa's cotton production has dropped since the mid-1990s and particularly in the new millennium following low prices and drought. Mozambique, Angola and Malawi also produce a small amount of cotton.

TRANSGENIC COTTON

Global cotton yields have doubled from the early 1960s to the late 1990s, a product of improved varieties, mechanical harvesting mainly in advanced industrial countries, and an increased use of chemicals and fertilisers (Baffes 2004:4). However, the use of pesticides resulted in negative environmental effects including a decline in soil fertility as chemicals destroyed the soil life, and pesticides also declined in effectiveness. Cotton bollworm and tobacco budworm resistance to organophosphates and pyrethroids has been rising in recent decades, in Africa and the US alike (Elbehri & MacDonald, forthcoming:4). These developments have encouraged research into cotton pest management techniques that are less dependent on pesticides. Integrated Pest Management (IPM) has been one route. Pest resistance had become so great in West Africa by 1998 that Burkina Faso, Mali, Cote d'Ivoire, Benin, Guinea and Senegal established a regional network to experiment with alternative methods such as IPM or threshold based spraying (Elbehri & MacDonald, forthcoming:10). These methods have proven highly successful where they've been implemented. The problem is that there has not been much effort to expand them beyond the small areas where they are practiced. The reasons for this include the privatisation push (see below) that has seriously limited extension services provided by the national cotton companies. There is also a lack of political will where cotton companies managed and controlled by elites are more amenable to the quick fix sort term solution offered by transgenic cotton than the more ecologically sound but longer term pest management processes that also require literacy training and intensive involvement of field staff to establish the programmes and engage with farmers (see GRAIN 2004c:7-11).

Genetically modified seed has been another attempt to overcome rising pest resistance and other problems with pesticides. There has been a rapid rise in the use of insect resistant and herbicide tolerant varieties of transgenic cotton since they were first commercially planted in 1996 in the US and Australia. In 2003/04, transgenic cotton varieties accounted for 21% of world cotton area and an estimated 30% of world cotton production. Nine countries representing 59% of world cotton area allow the commercial planting of transgenic cotton, including the US, China and India (ICAC 2004). An estimated 70% of cotton area in the US, 44% in Australia and 20% in China is planted with GM varieties (Baffes 2004:7). China has developed 11 of its own GM cotton varieties using public funds, and these are planted along with the imported varieties (Baffes 2004:8). To date South Africa is the only African country to permit the commercial planting of GM cotton (ICAC 2004). All GM cotton varieties planted in South Africa use imported technology (Biowatch South Africa 2003). Despite the apparently rapid growth of GM cotton use, in 2002 there was a global stagnation in the take-up of Bt cotton, resulting in the share of GM cotton as a percentage of total cotton production declining (James 2002:11).

Field trials of transgenic cotton in Africa are proliferating and it is only a matter of time before other countries join South Africa in commercial production. Egypt, the continent's largest cotton producer has a pro-GM stance. It has approved the commercial release of GM canola and is conducting field trials on a wide range of crops, including cotton (GRAIN 2004a). The USAID/Ministry of Agriculture supported Agricultural Genetic Engineering Research Institute (AGERI) has purchased an insect resistant gene from Monsanto to insert into a locally

developed cotton variety for expected commercial release in 2006 (Krauss 2004). Burkina Faso has field-tested Bt cotton since July 2003 even before biosafety laws were in place (GRAIN 2004b). In mid-2003 the Burkina Faso Fibre and Textile Company (SOFITEX) announced its plan to embark on transgenic cotton production in partnership with Monsanto and Syngenta (Agencies 2003). Reports in September 2004 indicate the country has approved the commercial planting of Bt cotton (Kalibwani et al. 2004:9). In Mali, The national agricultural research institute (IER) has been negotiating with Monsanto and Syngenta for field trials of Bt cotton (GRAIN 2004a). Despite this apparently slow take-up, there is a lot of activity around biotechnology and the introduction of transgenic cotton in West Africa, as detailed in the section on introducing transgenic cotton in Africa below.

South Africa has played a key role in bringing GM crops into Africa through research and development, legislation permitting the planting of GM crops, approval for the commercial planting of GM maize, cotton and soya, and the export of its biotechnology thrust into Africa using NEPAD (see Biowatch 2003). Elsewhere in Southern and East Africa, field trails of GM cotton are under way. The Ugandan government's acceptance of Bt cotton trials was adopted despite strong domestic opposition, including from the state-run Cotton Development Organisation (Ojambo 2002).

Of all transgenic crops in South Africa, Bt cotton has the highest adoption rate. In 2002, conventional varieties held about 25% of the market, Bt had 35%, stacked varieties had 30% and Roundup Ready herbicide resistant cotton (RR) had 10% (Gouse, Kirsten & Jenkins 2002:4). Other estimates suggest even higher percentages for the GM varieties. The amount of GE cotton is estimated to be at between 80% (Keetch 2003) and 90% (Jooste and van der Walt 2003) of total cotton planted. Large-scale commercial farmers account for about 95% of the crop, with smallholders producing the remainder (Gouse, Kirsten & Jenkins 2002:1).

It is useful to pay some attention to results of the introduction of transgenic cotton amongst the estimated 3000 smallholders on the Makhathini Flats in KwaZulu-Natal in South Africa because this is the first case in Africa where African smallholders have planted transgenic cotton commercially. The smallholders have been presented as proof that planting transgenic crops can benefit small-scale African farmers (see for example Kahn 2004). Smallholder adoption is through a contract arrangement, with farmers producing cotton on contract for buyers. This means inputs and extension services are provided, and there is a guaranteed market for the product (Biowatch 2003:63). A company called Vunisa Cotton provides inputs, channels credit to the farmers from the parastatal Land Bank, and buys the cotton after harvest (Biowatch 2003:64). The Department of Water Affairs and Forestry has also provided assistance by allowing the early release of water from the dam to benefit the transgenic cotton growers, but at the expense of other agricultural producers (conventional cotton and vegetables) whose crops are flooded as a result (Pschorn-Strauss 2003:2). The success of the Makhathini farmers has only been possible with high levels of support and infrastructure that makes for exceptional circumstances (Pschorn-Strauss 2003:4). This intensive support is also presented as an alternative

to key issues of wide-scale land redistribution and the broad provision of extension services to improve and build on the subsistence efforts of African farmers.

There is some indication that pesticide use has declined and yields have improved for Bt cotton users in South Africa as a whole (see Biowatch 2003:65-66). Forty-four percent of farmers surveyed gave savings on the cost of insecticide as the main reason for adopting Bt cotton (Ismael, Bennett & Morse 2002:3). However, the technology is expensive and this has been given as a key reason why some commercial farmers have stopped planting GM cotton and already started shifting back to conventional varieties (Gouse, Kirsten & Jenkins 2002:5). Very few if any of the small-scale farmers on the Makhathini Flats keep records of finances, yields or insecticide use, making comparison difficult. However, even small-scale growers who adopted Bt cotton continued spraying for bollworm (Pschorn-Strauss 2003:)

About one-third of internationally traded cotton in genetically engineered (ICAC 2004). There is no differentiation between GM cotton and non-GM cotton on the market. There is a niche organic cotton market, but it is small. From the consumer point of view, the link between the cotton grown in the field and the final product (like an item of clothing) bought in the store is tenuous. Segregation and labelling are less of an issue in cotton as a fibre (Baffes 2004). Less well known amongst consumers is that cotton does enter the food supply in the form of cottonseed oil. In West Africa, it is a major source of edible oil (Devlin Kuyek, pers comm. 13 Sept 2004).

So far, evidence does not point to a definitive rise in yields as the result of the use of transgenic cotton varieties. In some places, a rise in yields has been recorded, but highly dependent on supporting technologies and infrastructure (see for example Huang & Pray, 2002; Pray, et al., 2002; Huang, et al. 2002 for China and Whitfield 2003; Qaim and Zilberman 2003 for India). Farmers in the US and other countries that are fully integrated into an industrial agricultural system are more likely to benefit, as are better-resourced producers both inside the US and around the world. On the other hand a number of studies show that yields have not improved or that transgenic cotton crops have failed outright (see Hitavada 2002; RFSTE 2002; Shah and Banerji 2002; Deccan Development Society 2003; Khan and Chaodhry 2003; NGIN 2003 for India and Pakistan and GRAIN 2001; ISIS 2001 for Indonesia). Questions have also been raised regarding the quality of fibres from transgenic cotton varieties, including by William Duvanant, CEO of Duvanant Enterprises, one of the largest cotton merchants in the world (GRAIN 2004c:20).

The claimed benefit of Bt cotton rests more in the reduction in the use of insecticides than in higher yields. However, as with the yields, the relationship between Bt cotton and reductions in pesticide use is also not well established. The reliance on a single gene to eradicate pests is flawed because insects develop resistance to pesticides over time. The use of a genetically implanted Bt toxin will certainly have the long-term effect of eliminating Bt as a useful pesticide for all users. Genetic insertion also has detrimental effects on other non-target insects. For example, a study in China found that Bt cotton was not only harming natural parasitic enemies of the bollworm but also seemed to be encouraging other secondary pests such as cotton aphids, cotton spider mites, thrips and others (Xinhau News Agency 2002). In the US, overall pesticide use on Bt

cotton has remained stable despite a decline in the use of insecticide used against bollworm because of the growing importance of secondary pests (GRAIN 2004c:8). A report covering five years of commercial production of Bt cotton in China found that the resistance of Bt cotton to bollworm decreased significantly over time. Bollworm control was no longer complete by the third and fourth generations of the pest, and control falls to 30 per cent after 17 generations. Scientists said transgenic crops would require increasing amounts of traditional chemical over-sprays to control the pests within a few years, and Bt cotton would probably lose all resistance to bollworm after 10 years (Khan and Chaodhry 2003 cited in Biowatch 2003). In Australia the Committee of the Australian Cotton Growers Research Association (2002) reported that Bt cotton was in some circumstances failing to control the principal target pest cotton bollworm it was introduced for (for additional cases, see Biowatch 2003). In West Africa, most cotton growers spray their cotton fields with broad-spectrum pesticides that are used to control all cotton pests, not only those targeted by Bt cotton. This means that even if Bt cotton is introduced, these broad-spectrum pesticides will also still be used for all the other insects that damage cotton (GRAIN 2004c:8).

A reliance on Bt cotton as the only method of managing bollworm is not sustainable. Just as the use of the Bt toxin conventionally applied as a pesticide requires additional measures to limit pest resistance, so too does Bt cotton require additional pest management techniques. Greater knowledge of the pests and the way their resistance develops and the implementation of refuges in the field are essential, regardless of the variety of cotton grown (Elbehri & MacDonald, forthcoming:8-9).

INTRODUCING TRANSGENIC COTTON IN AFRICA

"We will defend US agricultural interests in every form we need to"

Richard Mills, a spokesperson for the United States trade representative, Robert Zoellick (quoted in Benson 2004)

As with the introduction of any technology in the current day and age, agricultural biotechnology is couched in developmental terms with the primary beneficiaries are presented as being the poor. According to International Institute for Tropical Agriculture (IITA) Director Peter Hartman, biotechnology "is an important tool that we need in the fight against poverty. It does not take much to realise that we have to use all possible tools when over 24 000 people died every day from starvation" (Checkbiotech.org 2004). Kenyan scientist Dr Florence Wambugu says: "In Africa GM food could almost literally weed out poverty" (Pearce 2000). In the case of transgenic cotton, African farmers are to be the recipients of technologies that will increase productivity and reduce input costs for farmers. Northern governments and private companies are presented as altruistic agents with the best interests of resource poor African farmers at heart. Thus US Agriculture Secretary Ann Veneman has said: "The U.S. remains committed to helping

Africa raise agricultural productivity, spur economic growth and alleviate hunger and poverty" (cited in McConnell 2004).

The USAID Initiative to End Hunger in Africa approaches the reduction of poverty "primarily through efforts to increase productivity and incomes in the agricultural sector" (Abt Associates Inc. 2003:3). Productivity enhancements in cash crops may raise incomes for some and thereby alleviate poverty. Yet rising cotton productivity in current conditions merely results in further depressed prices. In West Africa in particular, productivity is good by international standards and costs are low. Yields in West Africa are second only to Australia (Elbehri & MacDonald, forthcoming:29). Importantly, amongst the reasons for success of cotton in the region are the application of appropriate soil nutrient replenishment, and pest management and seed varieties that are well suited to local conditions (Gillson et al. 2004:45-6). Uniform seed varieties genetically altered for conditions in another country and parachuted in are not likely to solve the problems of poverty, even amongst West African cotton growers. Rising commodity prices where producers receive the benefits of those increases is a more effective short-term measure for reducing poverty.

The types of institutional, social and economic changes that are required to increase cotton productivity through transgenic seed have far greater negative effects on living conditions. In particular, poverty is exacerbated by trade liberalisation in the context of deep global inequality. With trade liberalisation, African farmers have to compete directly with the heavily subsidised and marketed agricultural products from the North (Makanya 2004). The focus on productivity has been interpreted as diverting attention from the issue of cotton subsidies that would by all accounts have a far greater impact on incomes amongst African cotton producers.

De Grassi (2003:i) outlines five criteria that should determine the introduction of new technologies into African agriculture. First, agricultural research must generate site-specific varieties to accommodate different conditions of production. Second, research should be led by the self-expressed needs of poor farmers. Third, there is a need to prioritise and choose the most cost-effective technologies. Fourth, environmental sustainability requires consideration not only of the second-generation effects of the Green Revolution (for example, damage caused by pesticide use) but also soil fertility. Finally, there is a need for institutional sustainability. In a detailed study of South Africa's smallholder cotton farmers, de Grassi found that the introduction of Bt cotton failed all of the criteria. The technology is uniform and imposed from outside without full information being provided (partly because information about long-term effects on environment and social organisation is unknown).

GM crops favour producers with large farms based on monocropping and uniformity, with a high reliance on external inputs (Makanya 2004). The need for a buffer zone of at least 25% - a figure even accepted by the pro-big business US Food & Drug Administration – is only economically feasible on large farms. In Australia, growers have to set aside 70% of their fields as refuge areas (GRAIN 2004c:19). Yet contrary to these characteristics, most African farmers are resource-poor and small-scale farmers who will be unable to afford the ongoing costs associated with technology fees, higher seed prices, increasingly privatised water costs and

chemical inputs. The targeting of large well-resourced farmers is a criticism that has emerged from farmer and civil society organisations in Uganda, Kenya and elsewhere on the continent (Ocwich 2004; East Africa Standard 2004; Kenya Small Scale Farmers Forum 2004).

In the dominant countries, domestic support to agribusinesses is extended to state involvement in establishing global frameworks and markets that favour the interests of corporate interests of national origin. Once again there are echoes of the Green Revolution where state officials blatantly expressed their agenda as being one of facilitating the global expansion of nationally based capital. In the present, state activities in pursuit of this agenda include subsidising producers, opening markets to corporations to access agriculturally produced inputs for industrial processes, trade and aid policies, including the encouragement of privatisation and deregulation where required, and an emphasis on intellectual property rights (IPR), and research and policy support. Each of these arenas will be considered with regard to cotton production in Africa.

PRODUCER SUBSIDIES

Producer subsidies in the US (52% of global subsidies in 2002/03) and to a lesser extent the EU (27%) and China (20%) serve to depress international prices while shielding subsidised producers from these lower prices. Being major players in the market, subsidies in these countries have a direct influence on the price of cotton (Baffes 2004:70). India accounts for most of the remaining percentage of overall subsidies (Goroux 2004:13). Most African states cannot afford major subsidies to cotton producers. Only Egypt has introduced limited offsetting support recently (Baffes 2004:11-12). Thus while African farmers are amongst the world's lowest cost producers, prices received are still often below costs of production.

In China, the government sets a reference price for cotton, usually above the world market price, and maintains import tariffs to bridge the gap between domestic and world prices (Baffes 2004:15). By 1990, China had surpassed the US as largest stockholder. This was the result of a 1985 shift in US policy from stockholding to price support (Baffes 2004:3). It caused a drop in cotton prices as stocked cotton came onto the market and US producers received a government boost in their competition with other producers around the globe. In 1999, Chinese policy reforms resulted in a further reduction in producer prices, a rise in cotton on the market and a lowering of stocks globally. The US has been picking up some of the slack demand by building a stock buffer that was slightly larger than China's in 2002 (Baffes 2004:59). In addition, some liberalisation in China took place, allowing direct interaction between producers and buyers with government permission.

In the EU, although the subsidy to Greek and Spanish producers is a smaller percentage of global subsidies than the US subsidy, it is more concentrated. At more than 60c/lb (Riboux 2002:3) the subsidy is consistently more than the international price of cotton, rising as high as 253% of international prices for Spanish recipients in 2001/02 (Baffes 2004:70). Reforms to the Common Agricultural Policy (CAP) in 1999 imposed a 'penalty' of reduced subsidies once

cotton production reached a predetermined maximum. However, this operated at the aggregate level rather than for individual enterprises, and has failed as a surplus containment mechanism (Baffes 2004:14).

The US cotton export industry has been globally dominant for centuries, since 1800 when it overtook the West Indies as the prime exporter of cotton to the engine of the textile industry, the UK (Roberts 1996:48). This history has allowed the powerful agribusiness lobby, the National Cotton Council, to draw substantial state subsidies towards the cotton industry, with cotton farmers receiving more per capita and per acre than any other group of US agricultural producers (Watkins 2003:5). In 2000 the cost of subsidies to the cotton industry was equivalent to the value added to the US economy by cotton production (Watkins 2003:4). In 2001, the value of subsidies exceeded the market value of output by around 30% (Watkins & Su 2002:2).

There are a variety of subsidies both for production and for export. The USDA's cotton marketing loan program is a state guaranteed floor price system. In 1999, subsidies under this program accounted for 40% of the market value of US cotton (Meyer & MacDonald 2001:8). The floor price was maintained under the 2002 Farm Security and Rural Investment Act where cotton producers are guaranteed a floor price of around 52c/lb, regardless of world market prices (Watkins & Su 2002:12). Over and above the guaranteed floor price, US producers receive additional payments to top up their income to a target price, set at 72.4c/lb (Watkins & Su 2002:12). This should be compared to the A-Index price of US$1.04 in 2002 (Baffes 2004:66).

An important aspect of the US subsidy is the significant export component. So-called 'Step 2' subsidies (the middle in a set of three) were introduced in the Food, Agriculture, Conservation and Trade Act of 1990 to keep US cotton competitive (Baffes 2004:69). Step 2 payments are government subsidies to US companies that export or mill cotton sourced from inside the US. Since 1995, the US government has made Step 2 payments to the value of US$1.68 billion to cotton companies (see EWG 2004a). The subsidy offers exporters additional payments when quoted prices for US cotton traded internationally are high relative to other cotton traded internationally (Roberts & Jotzo 2001:28). The Step 2 subsidies are also offered to domestic mills using US cotton to eliminate any difference between US internal prices and the international price (Watkins & Su 2002:15). A cursory look at the list of subsidy beneficiaries reveals the dominance of millers, ginners, and apparel and textile manufacturers (EWG 2004a).

Simply this means the government is paying mainly large-scale agribusinesses – including multinationals – to continue supporting cotton production in the US regardless of its economic cost. The subsidies are biased towards large-scale producers and processors, with the top 10 percent of recipients accounting for over 75% of the subsidy (Watkins 2003:5). According to EWG (2004a) the top twelve recipients (4% of all recipients) accounted for half the total payments, worth US$843.9 million between 1995 and 2002. The top five, who account for over a quarter of all Step 2 subsidies are Allenburg Cotton Co (owned by Louis Dreyfus), Duvanant Enterprises, Parkdale Mills Inc, Cargill and Calcot Ltd (California Cotton) (EWG 2004a).

Considering export earnings for Africa's largest exporter, Benin, were valued at US$124 million in 2001/02 (Watkins & Su 2002:18), the impact of the Step 2 subsidy alone on prices is clear. Cotton prices are historically low and declining. According to the Cotlook A-Index international cotton prices have been declining especially since the early 1980s in the face of growing competition from chemical fibres, rising productivity and government subsidies that encourage production regardless of cost. Real prices dropped 60% between 1980 and 2002 (Baffes 2004:66). Subsidies further depress the price, with world cotton prices calculated to rise by up to 20% if subsidies were withdrawn (Goreux 2004:16). Nevertheless, one needs to ask who will benefit from higher cotton prices? It is not possible to separate the issue of subsidies from the global expansion of input supply, crucially including seed, and concentration at the trading node. It is apparent, as will be indicated below, that transnational corporations supported by dominant states are positioning themselves to retain profits in an environment where subsidies are curtailed (even if not outright eliminated).

The continuation of the subsidy system reveals where the interests of the US government and US agribusinesses really lie. It is just one manifestation of a close relationship between states and corporate agricultural interests, especially in the advanced capitalist economies. In the US there is a revolving door between some of the largest biotech corporations and the USDA. Ann Veneman, current Secretary of Agriculture served on the board of Calgene, a biotech company later taken over by Monsanto. A number of other top officials also have direct links to biotech companies (Mattera 2004:26, 28). Federal funds have been used to finance the terminator technology that helps seed companies protect their intellectual property by rendering seeds sterile (ibid.:27). As shown above, the USDA provides massive subsidies to the cotton industry that outweigh the value of production.

The EU also has a general policy of support to large agribusinesses. In the mid-1980s, 60% of the EU budget was going to agriculture. Of this 80% was going to larger farmers (Brassley 1997:130). In 1999, just 2.2 per cent of the 4.5 million farms in Europe received 40 per cent of the total payments, and will continue to do so under CAP reforms proposed in 2003 and to be implemented from 2005 (Sharma 2004).

TRADE LIBERALISATION

There are two sides to trade liberalisation. On the one hand, large-scale producers need access to new markets in order to remove domestic surpluses. On the other hand, processing and value-added industries are constantly looking for new, cheaper sources of raw materials. The former encourage the reduction of barriers to market access in other countries, while the latter seek conditions that facilitate global sourcing.

In the post-war era, the agricultural trade regime was characterised by protection in the US and the EU. This facilitated the production of surpluses that had to be removed from the domestic market to retain profitability. States contributed to this removal either through facilitating access to markets in other countries or by holding surplus stocks. Although the latter was expensive, it

had the added advantage of creating a buffer to protect against sudden shortages. This was the US policy in the cotton industry after the passing of the Agricultural Marketing Act in 1929 (Baffes 2004:8). As previously mentioned, the end of the stockholding policy in the US in the mid 1980s and in China at the end of the 1980s resulted in a dramatic drop in prices as stocks flooded the market. It also led to market access in other countries becoming the key mechanism of surplus removal.

The finalisation of the General Agreement on Tariffs and Trade (GATT) Uruguay Round of negotiations in 1994 was the first step in the process of the selective liberalisation of markets and enforcing the reduction of state support to agricultural producers. By most accounts, the Agreement on Agriculture negotiated there was highly skewed towards the interests of the US and the EU. The agreement exempted these two from reducing support for a range of commodities under the 'blue box' and Peace Clause provisions. The Uruguay Round was most effective in eliminating or reducing direct tariffs and the cruder forms of non-tariff barriers. These are forms of protection generally employed by the poorest countries with the least sophisticated institutional structures (Raikes & Gibbon 2000:52). The US and the EU were able to exploit loopholes in the system to renege on their obligations to reduce border protection, they were given enough time to restructure their support from amber to blue box support without having to reduce the amount of support provided to agribusinesses, and reference dates against which reductions were to be measured were negotiated to limit the actual reductions required, especially by the EU (Einarsson 2000:15).

The result of the Uruguay Round in agriculture was that the US and EU continued to provide massive subsidies to their agricultural sectors. Total support provided by Organisation for Economic Cooperation and Development (OECD) governments in 1999 stood at US$361 billion. After a slight decline in the 1990s, support to agricultural producers had returned to the same level as the historical peak of 1986-88 (OECD 2000:23). On the other hand, developing countries that were not organised and were railroaded into the agreement were forced to open their agricultural markets to the subsidised surpluses from these big economies.

Negotiations for a new agreement failed in Seattle in 1999 and Cancun in 2003 when developing countries resisted US and EU attempts to steamroll another agreement on their own terms. After a long effort to restart negotiations, a framework was constructed to formulate a new trade pact. This so-called 'July framework' has been hailed as a victory for developing countries, with some commentators even referring to a 'post-subsidy' era after 'countries agreed for the first time to abolish all forms of export subsidies' (Lourens 2004; Njobeni 2004). However, such talk appears to be premature. French Agriculture Minister, Herve Gaymard informed the media that it would not be before 2015 or 2017 when export subsidies are completely eliminated (Sharma 2004a; Kwa 2004).

In many other ways the framework is also permissive to US and to EU interests. Article 14 of the Framework for Establishing Modalities in Agriculture (Annex A) of the July framework agreement states: "Any new criteria to be agreed will not have the perverse effect of undoing ongoing reforms". This clause permits the US and the EU to continue on the path of shifting

subsidies from former blue box to green box (permissible) subsidies by decoupling subsidies from production (Sharma 2004). As with the Uruguay Round, the amount of the subsidy will not change but the terminology used to define its legal status will. According to US Trade Representative Robert Zoellick, "A pledge by the US to reduce farm subsidies by 20 percent won't undercut payments Congress promised in a $125 billion bill in 2002". His colleague and chief US agriculture negotiator, Allen Johnson, told reporters: "The United States succeeded in shifting farm subsidies to a new WTO category (read 'blue box') to avoid actual reductions" (both quotes in Sharma 2004a).

Shifts to decoupled support under the 1992 CAP reforms in the EU and the 1996 Freedom to Farm Act in the US retain key features of previous subsidies that reinforce the connection between subsidies and current production decisions. According to Baffes (2004:x) these are: i) the failure to substitute all existing support measures for decoupled support; ii) the provision of support is not time-bound and thus open to indefinite continuation; iii) land must remain in agricultural use, meaning commodities will continue to be produced and impact on the world market.

Cotton received media attention during the July negotiations. Brazil took advantage of the lapsing of the Uruguay Round peace clause to launch a complaint against US cotton subsidies. The WTO ruled that the US was in contravention of its commitments under the Agreement on Agriculture and ordered the US to take appropriate steps to remove the adverse effects or to withdraw the subsidies "without delay" (WTO 2004a:350-51). The US has announced its intention to appeal parts of the ruling (Sapa-AFP 2004). Under the West African Cotton Initiative, four West African cotton-producing countries (Benin, Burkina Faso, Chad and Mali) also placed pressure on the US at the WTO negotiations to the eliminate production subsidies of any sort in the cotton sector, and the payment of compensation for as long as the subsidies remained in place. But given the July framework text it appears that US counter-cyclical payments approved in the 2002 Farm Bill, including cotton subsidies, will be shuffled around to fit into the new blue box and then reduced, but not eliminated, over time (Kwa 2004; Raghavan 2004).

Of importance to the African cotton sector is the Africa Growth and Opportunity Act (AGOA) in the US, concentrating as it does on providing access to the US market for textiles produced in Africa. The Act has a two-phase approach to the liberalisation of the textile sector in Africa. The Act allows for exports to the US of garments made from fabric produced anywhere in the world until 30 September 2004 (Clean Clothes Campaign 2002:9). Trade preferences under the Act are conditional on African governments liberalising agricultural markets, including the cotton sector (Watkins & Sul 2002:3). The Act is only open to African governments that take concrete steps towards the elimination of barriers to US trade and investment (AGOA, cited in Clean Clothes Campaign 2002:9). This first phase of liberalisation therefore serves to stimulate the African textile sector and encourages investment especially from US companies. It also provides a short-term boost to local producers able to take advantage of growth in the export textile industry. It

goes without saying that producers with resources available with be best placed to occupy this space.

The second phase of AGOA after September 2004 provides for limitless duty-free and quota-free access to the US market for garments that are made in eligible sub-Saharan countries from US, or AGOA-eligible country, fabric, yarn and thread (Clean Clothes Campaign 2002:9). This explicitly serves the interests of US cotton producers and processors since their subsidised cotton can arrive in Africa and still be cheaper than locally produced cotton. As shown in the section on African cotton production above, a number of US producer-processors already have ginning operations in place in Africa. The provisions of AGOA will favour those that can bring subsidised cotton from the US, process it in Africa using infrastructure owned by them, and export it back to the US for further value adding or for sale. AGOA excludes the import of raw cotton to the US from Africa (Gillson et al. 2004:8). Sanctions against Zimbabwe mean that products derived from Zimbabwean cotton will not be eligible for export to the US under AGOA. This denies the Southern African region in particular the ability to draw on a key cotton producer in one of the region's most competitive supply pipelines (Coughlin, Rubin & Darga 2001:xiii)

PRIVATISATION AND DEREGULATION

In order to take advantage of the trade regime, multinationals require reforms to give them access to the cotton sector in African countries. Historically these sectors have been monopolised by state institutions, and these monopolies have to be broken down to permit the profitable entry of multinationals. African cotton production already has a well-established infrastructure that TNCs can take advantage of (GRAIN 2004b).

African cotton sector restructuring has its roots in the sweeping structural adjustment programmes (SAPs) imposed by the World Bank and International Monetary Fund (IMF) on the governments of Africa and other developing regions in the 1980s and 1990s. The SAPs in turn were the outcome of the generalised global restructuring following the collapse of the Bretton Woods institutions, the oil crisis of the early 1970s, the rise of TNCs and the ballooning African debt (see Lawrence 1986; Cheru 1989; Onimode 1989; McMichael 1994; Friedmann 1994).

The structural adjustment programmes were premised on the idea that all economies would respond in similar ways to the same interventions. The IMF was designed to provide short-term relief for balance of payments crises, and it offered the remedies of deflation and currency devaluation as the only structural solution to persistent crises of this nature (Williamson 1993:180-81). These remedies are based on a model of economic activity that is significantly reliant on exports. Since it was poor countries with big debts and weak currencies that experienced balance of payments problems, the orthodoxy was applied to these economies. Although the IMF was supposed to provide short-term assistance, their remedies often altered the national economic priorities and strategies of borrowing countries (Padayachee 1993:185). This one-size-fits-all model of adjustment was imposed on African countries as a precondition

for aid and more recently as a precondition for limited debt relief. Every country received the same blueprint for adjustment, and all economic sectors were to follow the same path albeit sometimes at different speeds.

According to the imposed consensus that developed in the 1990s, agriculture was not merely to be seen as a platform for modern industrial and commercial sectors, but instead "as the engine of global and domestic market-oriented, private sector-led growth" (Abt Associates Inc. 2003:3-4). This was to be facilitated by governments that would "create a favourable investment climate by withdrawing in favour of the private sector from potentially commercial spheres of activity" and by safeguarding the openness and competitiveness of markets (ibid.:4). In agriculture, this one-size-fits-all model first focused on pricing and later on liberalisation and deregulation with an export orientation (Larsen 2001:1). This included the dismantling of vertically integrated parastatals that had provided farmers with inputs and credit, transport and storage infrastructure and marketing support. In many cases, statutory control boards set prices and operated surplus removal schemes. As we saw in the section on subsidies above, the US government retains these elements as key parts of its regulation of the domestic cotton sector. However, for African and other developing countries these forms of economic activity were deemed inappropriate and were to be eliminated.

State seed companies were also privatised, speeding up the process of seed supply concentration. In South Africa, for example, Monsanto acquired the two largest seed companies, Carnia and Sensako, in the late 1990s. According to Wally Green, then Biotechnology Regulator Manager for Monsanto in Sub-Saharan Africa, Monsanto controlled 40% of the total seed market in South Africa in 2001 (Contact Trust 2001). The opening of the seed market in sub-Saharan Africa to the private sector has become more important with the advent of genetic modification. The introduction of GM crops could increase the value of seed markets by 50%, making even the relatively small African market quite valuable (Kuyek 2002a:4).

The focus of private sector seed supply is on large-scale commercial farmers. Despite claims that GM crops are the answer to millions of small-scale farmers in Africa, Kobus Lindeque, Monsanto's Southern Africa MD, is forced to acknowledge that more than 95% of Monsanto's business in South Africa is with large commercial growers (Kahn 2004). Currently, formal seed supply systems in sub-Saharan Africa (including research and development) cater for less than 10% of the needs of farmers, because they concentrate on major food and cash crops which are considered national priorities in terms of foreign exchange earnings (Larinde 1997:1). The transnational seed companies will continue to function through the formal supply system, with farmers who are already integrated into the formal system being first to receive new, including GM, varieties.

Across Africa, the cotton sector relied on vertically integrated parastatals for the provision of seed as well as information, infrastructure and marketing. These systems served the primary purpose of diverting raw or ginned cotton into export channels for processing in the metropolitan countries, mainly France and the UK. While otherwise fragmented smallholders benefited from these arrangements, monopoly control over buying and marketing suppressed

differentiation amongst primary producers. In country after country, larger producers sought to expand their operations. These producers required freedom to seek better prices and also had the necessary economies of scale to stand on their own in the market. Structural reforms served to differentiate producers to the benefit of larger producers and to the general detriment of smaller, remote and disorganised producers. Nevertheless, despite this growing differentiation, larger more organised producers are not uniformly in favour of privatisation and deregulation of the national cotton system (Devlin Kuyek, pers comm., 5 Oct 2004). Privatisation introduces the possibility that private monopolies merely replace public monopolies, and primary producers continue to receive little benefit.

Larger, export oriented producers and traders, including transnationals, are the targeted beneficiaries of restructuring. The first step has been to target the break-up of state monopolies that are no longer serving the interests of capital accumulation. However, this has been uneven. Like in South Africa's privatisation process, markets have not always been favourable to the privatisation of state assets especially where profitability is uncertain. In the meantime, the state entities are 'corporatised' in readiness for privatisation. This includes the reduction and elimination of state subsidies, especially to agriculture. Comments by Canadian Finance Minister Ralph Goodale on a visit to South Africa suggested that even South Africa's land redistribution programme could be considered as a violation of any future WTO agreement on domestic support to agriculture (Katzenellenbogen 2004). This excessive pressure on African states to withdraw from involvement in the economy and retreat to a market-facilitating role can have severe consequences for resource poor farmers.

In some countries, export crop marketing was fully liberalised in a short space of time with little planning. This 'big bang' approach was carried out in the cotton sector in Nigeria in 1986, when the government abolished the cotton commodity board that had held a monopoly on the pricing, subsidisation, purchasing and marketing of cotton (Shepherd & Farolfi 1999:12). Nigerian cotton production has increased as a result (Baffes 2004:71) but only through concentration of resources amongst wealthier farmers and the land alienation of smaller peasants (Bonat & Abdullahi 1989:167-170). Despite its early liberalisation, the cotton sector remains without adequate mechanisms for quality control nearly 20 years later (Gillson et al. 2004:41).

In other countries the state progressively disengaged from crop purchasing, export marketing and processing. In Egypt, the single largest cotton producing country in Africa, liberalisation and privatisation began in the late 1980s with the removal of cropping restrictions and a focus on prices. With USAID and GTZ sponsorship, seed cotton marketing, ginning, cotton lint export and the domestic trade in cotton were later liberalised (Holtzman & Mostafa 2002:viii). Public ginning companies were privatised in the mid to late 1990s, although public ginners still gin 58-67% of the seed cotton crop (ibid.xi). The private sector has become well established in seed cotton marketing, ginning, exporting and spinning, although the Egyptian government still plays an important role in setting prices and quotas, allocating market shares and determining varieties to be grown indifferent regions (ibid.:ix). Public cotton trading companies have not yet been privatised, and continue to dominate seed cotton marketing (ibid.:x).

The Lint Marketing Board in Uganda was a monopoly exporter until 1993 when the privatisation of marketing began (ICAC 1994:15). After that, the board continued to compete in a limited way with the private sector for export markets (Shepherd & Farolfi 1999:13). From a sectoral point of view, the reforms have resulted in increased production and improved availability of inputs including agrochemicals, farm tools and implements, although there have been some problems with credit provision (Shepherd & Farolfi 1999:32). Nevertheless, it appears that after this initial supply response to liberalisation, the sector became constrained by the inability to deliver services (seed, credit and extension) or to maintain quality control (Gillson et al. 2004:43).

In Tanzania, export marketing was liberalised in phases. In 1984 co-operative unions replaced the Tanzania Cotton Marketing Board as monopoly buyers and processors. The Board continued to be responsible for exports and as a production services provider. Since 1994/95, private traders have been allowed to purchase, process and export cotton (Shepherd & Farolfi 1999:16). An industry board (the Tanzania Cotton Lint and Seed Board) with control and regulatory functions replaced the cotton board (Shepherd & Farolfi 1999:13). Cotton production has been uneven in the period since then (Baffes 2004:71), and quality has declined significantly as a result of breakdowns in grading/quality control and input supply (Raikes & Gibbon 2000:73; Shepherd & Farolfi 1999:27). Quality suffered with the private construction of saw gins that produce a lower quality of processed cotton than roller gins (Shepherd & Farolfi 1999:39). The regulatory 'zonal' system that ensured that varieties remained separated and that pests and diseases were contained broke down as new ginneries were built and competition for seed cotton rose (Shepherd & Farolfi 1999:49). The sector fell deeper into crisis to the extent that the Tanzania Cotton Board began to play a more interventionist role in input supply and quality control. This led to some recovery in a production since 2000, despite historically low world prices (Gillson et al. 2004:42).

In Ghana, cotton was liberalised with the privatisation of the parastatal Cotton Development Board that became the Ghana Cotton Company. Private competition was permitted and in 1999 there were 3 firms operating ginneries and 9 in marketing. The privatised Ghana Cotton Company accounted for around 60% of the market, indicating a shift from a state to a private monopoly (Shepherd & Farolfi 1999:19). Private companies provided inputs paid for from the proceeds of the harvest (Shepherd & Farolfi 1999:33).

Privatisation in Cote d'Ivoire started in 1997 and has opened the door for multinational investment, with Louis Dreyfus announcing the construction of a cotton ginning facility in 1999, and Swiss trading company Paul Reinhart bidding for three cotton gins (Levin 2000). The parastatal CIDT (Compagnie Ivoirienne de Developpement des Textiles) agreed to stop providing inputs for the 2000/01 crop (Levin 2000). In Benin, reforms to the state-controlled single channel cotton system were only contemplated from the late 1990s (Gillson et al. 2004:38). However, the national cotton company has now been privatised, with multinational cotton company Aiglon one of the largest beneficiaries. Privatisation has led to the collapse of input supplies previously provided through cotton ginning (Watkins & Su 2002:9).

In Zimbabwe, the Cotton Marketing Board controlled and coordinated the cotton chain from input supply to lint sales. It did this in the context of a shift from white large-scale commercial farmers to black small-scale communal farmers that saw cotton production expand, driven by parastatal investments in provision of support services to new areas. Large-scale commercial farmers produced 80% of total cotton in 1980, but by 2001 they only produced 10% (Gillson et al. 2004:44). The board owned 8 ginneries with another privately owned ginnery operating as an agent for the board (Larsen 2001:7). In 1994 the board was corporatised and its name changed to the Cotton Company of Zimbabwe (Cotco). The company was fully owned by the government but placed in readiness for privatisation, which occurred in 1997 with the state owning 25% of shares. Following liberalisation, private capital was allowed to enter the market at any stage of the chain. Cargill and a cooperative formed by large-scale commercial farmers entered the market (Larsen 2001:9). These three companies dominate the market and offer production services and inputs to producers in exchange for cotton being sold to them. Input credit schemes have been an important way of tying producers to the companies thereby securing sufficient and reliable supply of high quality seed cotton (Larsen 2001:15).

In Zambia, a parastatal called the Lint Company (Lintco) provided inputs and extension services, and ginned and marketed the crop. In 1986 Lonrho opened a ginnery and was later permitted to organise an outgrower scheme to supply the ginnery. In 1991 the government stopped fixing producer prices. In 1995 Lintco was privatised and its assets sold to Lonrho and another private company (Shepherd & Farolfi 1999:16). Cotton production in Zambia rose significantly at this point (Baffes 2004:71). An initial flurry of small producers was quickly thinned out as many were forced to exit under pressure from low world prices in the late 1990s (Gillson et al. 2004:43). Lonrho operated a vertically integrated system similar to the way most parastatals functioned before liberalisation, providing seed, extension support and chemicals to outgrowers (Shepherd & Farolfi 1999:35). After Lonrho exited the ginning sector in 1999, the sector remained concentrated with Dunavant and Clark Cotton maintaining an 80-90% share of the market (Boughton et al. 2003:6). Clark Cotton competes in one region with Duvanant dominating the rest of the country. Dunavant subcontracts extension and credit provision to independent distributors (Boughton et al. 2003:7), thereby transferring the risk of credit recovery to an external source.

In other southern African countries there have also been processes of privatisation, deregulation and trade liberalisation. In Mozambique, cotton production has increased by 60% between 1990 and 1998, with a corresponding increase in exports of ginned cotton. This growth has occurred on the back of a process of public-private joint ventures where cotton companies are given exclusive rights to purchase cotton from smallholders in a designated ‘zone of influence’ (Pitcher 2002:213).

Finally, there are those countries that retain a single channel export marketing system. In Mali, the vertically integrated, state-owned CMDT (Compagnie Malienne pour le Developpement des Fibres Textiles) continues to provide inputs, extension support, a guaranteed market for smallholder cotton farmers and a limited subsidy to Malian farmers. The CMDT controls

collection, ginning, baling and export (Tefft 2004:1-2). Nevertheless, there is growing pressure to privatise these functions, primarily from the World Bank (Levin 2000; Gillson et al. 2004:37).

In Chad, the parastatal company CotonChad retains a monopoly on cotton processing. The company is 75% owned by the state and 17% owned by DAGRIS, the privatised arm of the CFDT. The company provides inputs on credit and organises their distribution, purchases, collects and transports cotton to its 9 ginneries, and gins and commercialises the cotton (World Bank 2003:2). The government adopted a liberalisation and privatisation programme at the end of 1999. The results so far have been retrenchments of more than half the workforce in the company and the closing down of some ginning facilities. Peasants are being made to bear the full costs of fertiliser, pesticides and carry transport costs (World Bank 2003:3-4).

In Burkina Faso the single channel cotton marketing system remains, but with some integration of farmers into ownership and management of the system. The cotton sector in Burkina Faso is considered to be the best functioning in West Africa (Gillson et al. 2004:38), indicating that privatisation and fragmentation of vertically integrated chains is not necessarily the best path to follow in every case. In West Africa as a whole, privatisation and deregulation is slower because the vertically integrated parastatals remain effective. The success of cotton production in the region is attributed to the provision of support services and infrastructure, guaranteed producer prices and output markets and well-organised village level associations, amongst other factors (Gillson et al. 2004:46). Prior colonial links means that most cotton exports are still directed through France. Exports from the region are mainly handled by COPACO (Compagnie Cotonniere), a private entity attached to the French parastatal Dagris (formerly the CFDT).

Nevertheless, COPACO's dominance in West Africa has increasingly come under pressure as privatisation reduces its de facto monopoly and other companies have emerged to compete with it. Mambo Commodities, founded in 1994 and headquartered in France, sources primarily from Cote d'Ivoire and Mali for shipment to East Asia. Another growing competitor in West Africa is the Swiss-registered company, Groupe de l'Aiglon (ICAC 2000:5). The Meredith Jones group of companies and Plexus Cotton operate out of the UK and source cotton from Africa (ICAC 2000:6). Australian company Colly Cotton also sources some of its cotton from West Africa (ICAC 2000:4).

The expansion of the largest cotton trading companies in Africa from the mid-1990s is directly attributable to deregulation and privatisation (Gillson et al. 2004:6). According to Raikes & Gibbon (2000:62), "competition between international buyers of Africa's export crops is structurally very limited, with only a handful of importing enterprises exercising a high degree of market power". Many of the biggest US merchants are unknown in Africa, given their historical economic links with South, central and North America. Nevertheless, there are US-based corporations involved in trading, manufacturing and export of cotton from Africa either directly or through Europe. In some countries, including Tanzania and Zimbabwe, Cargill exports cotton. Cargill subsidiaries Hohenberg and Ralli Brothers and Coney, two of the world's largest cotton companies, are independent of one another but co-ordinate their global activities, with

Ralli Brothers and Coney trading non-US origin raw cotton worldwide, including from Africa (Kneen 1995:168).

Louis Dreyfus also has a presence in Africa, through Paris-based Louis Dreyfus Negoce SA, with offices in Kenya and Johannesburg and a subsidiary in Zambia. The corporation's main African operations are in grains and oilseed, but it also trades and merchandises in cotton from Africa through its subsidiary Louis Dreyfus Cotton International, based in Belgium.

Although not a main profit centre, some transnationals are also involved in production and ginning in Africa, since ginning to produce lint is a requirement to qualify the cotton crop for international trade (Raikes & Gibbon 2000:83). Traders without guaranteed access to ginning facilities may find it difficult to stay in business as those with ginneries gin their own seed cotton first and thus enjoy preferential access to markets for ginned cotton (Shepherd & Farolfi 1999:39). Deregulation resulted in a fragmentation of supply and this prompted traders to become more involved in producing countries to ensure constant supply of required quality and quantity (Gillson et al. 2004:6).

Dunavant Enterprises mainly operates in North and Central America, Europe and Asia, but also has ginning offices in Zambia (Dunavant 2004). Louis Dreyfus is involved in a number of industrial cotton projects in West Africa (Louis Dreyfus 2004, 2004a). Cargill Zimbabwe owns three cotton gins at Tafuna, Chegutu and Gweru which process 30 percent of the country's cotton. The cotton is exported to South Africa, Europe and the Far East (Cargill 2004). UK-based Bauman Hinde and its parent company Lonhro have ginning operations in Africa (ICAC 2000:5). Lonhro is one of the few international traders with a historical corporate preference for outgrower-type schemes where farmers produce on contract for the corporation. Lonhro has expanded cotton schemes on this basis to Mozambique, Zambia and Uganda (Raikes & Gibbon 2000:76-77). On a smaller scale, South African company Clark Cotton also operates an outgrower scheme in Zambia (Raikes & Gibbon 2000:77).

Overall one has to say that in the context of smallholder production, there are obvious benefits to non-profit vertical integration as was the case with the parastatals. Cotton can only be procured by large buyers and ginning companies with adequate working capital (Shepherd & Farolfi 1999:24). From a producer point of view, the processes of liberalisation and deregulation have increased differentiation amongst producers and favoured larger, better-resourced producers over smaller, remote and resource-poor producers (Shepherd & Farolfi 1999:65). States are also unlikely to plough the profits generated from their previous monopoly control of the parastatals and the proceeds from the subsequent sale of these entities into providing support to cotton producers. At best, some of these resources will be used as a kind of subsidy to the big companies that have taken over, by providing essential services such as quality control, infrastructure development and research that used to be paid for from cotton revenues. The provision of these services will be framed by the needs of the export companies rather than the needs of the producers, because the companies will have greater leverage to play states off against one another for investment.

Liberalisation and deregulation have also had a knock-on effect on secondary and tertiary processors. While they used to receive preferential access to raw materials they have now been forced to compete against export buyers. Unlike many local processors, export traders are not short of working capital to procure lint on a cash basis (Shepherd & Farolfi 1999:40). The flipside of trade liberalisation is also that textile mills producing mainly for domestic markets are increasingly exposed to competition from cheaper imported textiles and garments (Shepherd & Farolfi 199:42). This will certainly be the case with the elimination of import quotas on textiles at the start of 2005 in accordance with the WTO Agreement on Textiles and Clothing.

Amongst other conclusions drawn from a detailed study conducted under the auspices of FAO, Shepherd & Farolfi (1999:63-65) indicated that in most cases of liberalisation, implications of major changes to the marketing system were inadequately considered; serious quality control problems have arisen as a result of input supply failures, disintegration of extension services and lack of trader knowledge; short term farmgate price increases may be offset by medium and long run lower prices because of lower quality, increased world production as a result of liberalisation and reduced competition caused by increasing concentration in trading. Global cotton markets are 'sticky' in the sense that spinners prefer to source from the same place consistently because their equipment has to be geared towards the particular characteristics of the cotton they receive. Nevertheless, severe problems in quality and supply can force them to shift elsewhere, resulting in lost markets for producers whose quality declines substantially (Gillson et al. 2004:25-26). Once they've shifted to different suppliers, they may not return easily. The quality problems caused by liberalisation and deregulation in many African countries has meant a loss of markets.

INTELLECTUAL PROPERTY RIGHTS AND PATENTS

> *"Our vision is for a regulatory system that favours investment and innovation. We will stifle innovation if our framework fails to provide sufficient financial rewards to justify continued investment"*
>
> (Michael Pragnell, President, CropLife International and CEO of Syngenta, 3 June 2004, quoted in CropLife International 2004)

The introduction of genetically modified crops into Africa is based on the ability of corporations to control the technology and generate a profit from it. Since these corporations have legal ownership of much of the technology, they will determine how and when it is used.

As discussed above, the trade regime is structured to accommodate the interests of patent holders. One of the requirements for participation in AGOA, for example, is the protection of intellectual property (AGOA, cited in Clean Clothes Campaign 2002:9). The EU is using acceptance of trade negotiations in the framework of Economic Partnership Agreements (EPAs) by the six African, Caribbean and Pacific (ACP) regions to push for the inclusion of competition policy and intellectual property rights protection (ACTSA 2004). The WTO has a whole agreement on Trade Related Intellectual Property Rights (TRIPs). Signatories are bound to comply with the terms of the agreement that include the protection of corporate patents

(Consumers International 2003:11). The agreement has significant implications for Africa because prior to its' coming into force in 1995, almost every African country excluded living organisms from patentability in domestic legislation (Olembo et al. 2004:4). In the same way that the agreement on agriculture was skewed towards the interests of the globally dominant countries and corporations, so intellectual property rights are skewed towards the protection of registered property rights in the dominant countries. The IPR framework allows these companies to consolidate their control over the global food and fibre chains, through the patenting of varieties that incorporate the work of centuries of plant improvement activities by countless farmers and plant breeders who receive no recognition or right to ownership in law once these are patented.

Between them, Monsanto, Du Pont, Syngenta, Dow, Aventis and Grupo Pulsar held 1011 patents on food crops in 2003 (Consumers International 2003:11). These include some of the fundamental tools required for any genetic manipulation. For example, Cornell University sold the rights to its "particle gun" for introducing new genetic material into plants to Du Pont. Any researcher leasing the gun had to sign away rights for any commercially viable products to Du Pont or pay royalties (Piore 2003). The cellular parts essential for any genetic engineering have already been patented (Egziabher 2003). Once these rights are captured, the development of third generation biotechnology anywhere in the world accrues profits to the patent owner. A study sponsored by the World Bank found that "most of the benefits associated with GM products in the other cotton producing countries [apart from China, where the state has developed GM cotton varieties] go to biotech and seed companies" (Baffes 2004:8). If a biotech laboratory is set up in South Africa or Korea or Costa Rica, it will need technology that is owned by a corporation. There is a close relationship here between patent rights and the privatisation of agricultural research discussed below.

For the patent owner, potential profits can only be realised if their ownership right is legally enforceable. There is no use to the owner of allowing the use of the technology unless there is a return. This means setting up a legal framework in each country where the technology can be used to protect the private intellectual property rights. But it can't stop here. A functional private property rights system rests on a uniform macro-political system. Colonisation enforced conformance with internationally dominant interests. Structural adjustment in the 1980s and 1990s enforced the necessary economic and political restructuring for new accumulation requirements. Intellectual property rights are part of this restructuring. Biotechnology alone did not motivate this shift, but its commercialisation is advanced by it.

One of the tools of enforcement of IPRs is the contract. In the US, farmers had to sign contracts guaranteeing that products would not get into products destined for the EU market; a US$6.50 'technology' fee per 50 lb bag and contracts allowing Monsanto to enter farmers fields to make sure seed was not saved from previous year (Heffernan 1999:1). According to Leon (1997:15), US growers were initially charged US$80/ha in technology fees for Bt cotton, and Australian farmers were charged US$245/ha. Roundup Ready cotton, introduced a year later, had technology fees of between US$12 and US$20/ha depending on variety. Stacked gene varieties

would have a technology fee of US$100/ha (Leon 1997:15). These technology fees are over and above the higher cost of transgenic varieties and licence fees.

In South Africa, while Bollgard cotton costs just 8% more than traditional varieties, there is an additional technology fee of SAR600/bag (US$92 at SAR6.50/$) (Kirsten & Gouse 2002:6). The introduction of Monsanto's Bollgard II in West Africa will not attract a technology fee of anything less than US$50/ha (or 30 300 CFA/ha). In Mali, the total price of insecticides averages 37 600 CFA/ha (US$62/ha). So even if Bollgard II cuts insecticide use in half (and international evidence suggests this is optimistic), the cost of seed will outweigh the savings in pesticide use (GRAIN 2004:2-3). If GM seed becomes more popular, corporations can be expected to increase prices to raise their own profits. According to Hugh Grant, Monsanto chair, the company will raise prices in 2005 for certain Roundup Ready soybeans by $4 to $5 an acre and by $2 an acre for Roundup Ready corn (New York Times 2004). Another onerous term of the contracts is that growers must agree to exclusively use the seed company's chemicals (Pschorn-Strauss 2003:6).

The drive by USAID and multinational biotech companies is for laws that recognise the latter's full IPRs. The potential negative impact of patented seed on the right and ability of local farmers and breeders to use and propagate seed is recognised by the EU as one of the dangers of introducing GMOs into African agriculture (European Commission 2003, cited in Kalibwani 2004:29). At the same time, the EU is pushing for protection of intellectual property rights through the EPAs. Contrary to the argument that protection of intellectual property rights is essential for innovation, it becomes apparent that strict adherence to such protection may prevent innovation. This is especially the case where public research (most agricultural research in Africa is public) relies on the free transfer of germplasm that becomes privatised and is only available for a fee and through following long bureaucratic procedures (Olembo et al. 2004:3). The UN Commission on Trade and Development found that "to date, there is little conclusive evidence that strengthened intellectual property protection would consistently expand the transfer of technology to developing countries" (cited in Olembo et al. 2004:10).

The protection of public access to certain plant varieties through the International Treaty on Plant Genetic Resources in no way suggests that Africa will not be required to establish legal and institutional systems that protect intellectual property rights. Already regional organisations such as the African Regional Intellectual Property Organisation (OAPI) are working to harmonise intellectual property laws amongst member countries, building capacity and registering intellectual property (Olembo et al. 2004:7). USAID, the Rockefeller Foundation, the European Patent Office, the World Intellectual Property Organisation (WIPO) and CGIAR are all involved in building capacity in Africa (ibid.:8).

AGRICULTURAL RESEARCH AND BIOSAFETY POLICY

Historically, innovation in seed technology has been a freely shared or public good, with farmers sharing better performing varieties with neighbours. National agricultural research organisations

developed varieties that were disseminated through public channels. But with the advent of biotechnology and patenting, research and control of seed technology has shifted to the private sector (Taylor & Cayford 2003:8). In the US and UK, many studies have shown the link between corporate interests and university scientific researchers. Academic institutions and other public bodies are increasingly dependent on the private sector for funding, support and advice (Bowring 2003:112-117). This not only shapes the kind of research that is done, but also ensures that research is geared towards making profits.

As with the trade regime, Africa has value both as a potential market for commercial products and also as a source of raw materials. Raw materials and the technological infrastructure to convert those raw materials into potentially profitable products are at the heart of the capitalist production process. For most of the history of industrial capitalism, raw materials have been sourced from other parts of the world and taken to the core countries for processing and value adding. "Every major commercial crop grown in developed countries today originated in what are now termed developing countries," says Umberto Menini of FAO. Yet plant breeders are now using these varieties as the raw material for fashioning new crop varieties, which are then patented (FAO 1998:1). Genetic resources required as raw materials for the genetics industry are geographically concentrated in areas under the jurisdiction of peripheral states, especially in Asia, Mexico and parts of Latin America and Africa (Fowler & Mooney 1990:32). West Africa is a regional centre of origin and genetic diversity of crops (Kalibwani et al. 2004:22).

There is a growing importance of developing country germplasm for inclusion in biotech R&D. As the increasingly few and uniform varieties that dominate the major crops become susceptible to the evolution of pests and diseases, landraces and other older varieties will need to be examined for resistances whether through crossbreeding or genetic modification at a molecular level (Fowler & Mooney 1990: Chap 4).

The growing concern around the reduction of genetic diversity has led to a number of international environmental agreements. There are different interests at stake. On the one hand are those who require genetic materials as inputs into processes that may lead to a patent and maybe eventually a commercially viable product. These companies and countries have an interest in open access to genetic resources for anybody to exploit, especially when these resources are not found in their own jurisdictions like the US. On the other hand there are those countries and peoples that rely on genetic diversity for their survival. This is particularly the case where countries rely heavily on their natural resource base, like most developing countries. While these countries may not be averse to sharing genetic resources, they would want to ensure they share the benefits of improvements based on the resources they are safeguarding.

The International Treaty on Plant Genetic Resources is of key importance in this regard. The Treaty recognises the right of farmers to save, use, exchange and sell farm saved seed or propagating material. It also affirms that farmers have the right to the fair and equitable sharing of the benefits arising from the use of plant genetic resources, and to participate in decision-making in this regard. The Treaty also sets up a multilateral system for access and benefit sharing (FAO 2001). In negotiations leading up to the Treaty, the International Undertaking was watered

down and subject to numerous compromises in the hope that all parties would accept it as legally binding. In particular, the subordination of farmers' rights to national laws undermines these rights by not making them legally binding at international level and allowing national governments to remove these rights if they so decide. The Treaty does not comprehensively cover all the crops required for food security. At present, just 35 families of food crops and 29 forage species are included (statement made by public interest, non-profit Civil Society Organisations to the 31st FAO Conference, 3 Nov 2001). Despite these weaknesses, the Treaty creates a base for the protection of public access to and benefit sharing of genetic resources. The US has refused to endorse the Treaty.

The Cartegena Protocol on Biosafety, which came into force in September 2003, is also important. It restricts trade in genetically modified organisms on the basis of the precautionary principle and the principle of prior informed consent. The Protocol relies on the labelling of GMOs for its effectiveness because otherwise there is no way of tracking goods with GM content. But the US, the largest producer of GMOs in the world, is not a signatory to the Protocol and refuses to label GM products (Egziabher 2003). This means that other countries can't manage the inflow of GM goods into their areas of jurisdiction. There is an interesting contradiction to be noted in the US position, that a transgenic plant is novel enough to be patented, but it is not novel enough to be treated differently when it comes to conservation and sustainable use of biological diversity or human health (Kalibwani et al. 2004:20).

Since the EU's moratorium on the commercial use and import of GM crops in 1998, the US has attempted to use the WTO framework to strike the moratorium down as an illegal barrier to trade. Since a number of crops in the US, including cotton, are mostly transgenic and the EU is one of the largest markets for cotton, this is an important battle for the US cotton industry. Together with the US, other members of the 'Miami Group' of GM crop exporting countries (Canada, Australia, Argentina, Chile and Uruguay) are trying to limit the Biosafety Protocol's provision of prior informed consent to exclude GM food or feed products that have been processed so that they can' reproduce in the environment (Pew Institute 2004). Indeed, they make the argument that the Protocol already excludes non-living organisms such as processed foods by its specific reference to 'living modified organisms' (Kalibwani et al. 2004:18). The US is also opposing European attempts to include non-scientific social, cultural and political elements into the food safety standards system - the Codex Alimentarius. The Codex commission essentially sets minimum food safety standards that can be used to prevent food imports in a way that does not transgress WTO rules (Pew Institute 2004).

Meanwhile, the US and biotech companies have been driving an alternative process based on the formulation of national biosafety laws. These laws aim to shift the focus away from biosafety and towards capacity building in biotechnology (Mayet 2003). This process leads on from the role of the US in the negotiations around the Convention on Biodiversity in the early 1990s, where it supported the creation of national biosafety laws rather than the developing country position of a single international law (Kalibwani et al. 2004:14). In case after case, the lack of a regulatory framework is held up as a key reason why genetically modified organisms cannot be

commercially introduced into Africa (see for example Mabwe 2004; Ngatya 2004; Ouedraogo 2003; ISNAR 2003).

These initiatives aim to replicate South Africa's weak biosafety laws across the continent. South Africa's GM regulations are little more than a permit system designed to expedite GM imports into the country and releases into the environment. The Genetically Modified Organisms Act specifically mandates that biosafety risk assessment involve no more than a paper audit, which entails a review of 'safety' information generated by the corporations during product development (Mayet 2003). The recently tabled Biosafety Bill in Kenya has come under similar criticism. Eric Kisiangani of Intermediate Technology Development Group - East Africa (ITDG-EA) says the draft Bill "seems to be more of a mechanism to facilitate and approve GMOs, rather than to regulate them" (Kenya Small Scale Farmers Forum et al 2004).

Biosafety laws create the framework for the introduction of GM crops into Africa. In many instances, the formulation of laws and the initiation of research into transgenic crops occur simultaneously. Across Africa, TNCs or foreign governmental and quasi-governmental institutions that favour the introduction of GM crops increasingly provide agricultural research funding. Structural adjustment in the 1980s and 1990s led to a decline in government funding to agricultural research resulting in loss of skilled staff, lack of necessary infrastructure and an increasing reliance on raising funds from international donors or the private sector to carry out work (Abt Associates, Inc 2003:2). This opens the door for international donors including USAID and private corporations to step in and set the research agenda.

As private finance for biotech dries up in the industrialised countries, the industry is increasingly turning to government to provide investment to push GM crops into Africa. USAID has indicated its intention to play its part to "integrate biotechnology into local food systems and spread the technology through regions in Africa" (US Dept of State 2002). This is to be on a commercial basis. A USAID report in Uganda indicates that wants biotechnology support to be geared towards crops that are most likely to be commercialised in a short time, with a specific mention made of Monsanto's Bt cotton. USAID in essence has threatened to withdraw from biotechnology support, including biosafety support, if the emphasis is not placed on crops that can be commercialised ahead of crops that can be of greater benefit to Ugandans (Mayet 2004a:3). Once transgenic crops are in the ground and a regulatory system is in place, the threat of states outlawing their use is eliminated.

Capacity building to carry out biotechnological research is closely linked to the research agendas of private companies. Generally, USAID supported programmes to extend biotechnology into Africa are partnered by the large biotech and seed companies. Monsanto and other biotech corporations sponsor USAID (Greenpeace 2002:6). In turn, USAID has paid US biotech corporations to run GM research programmes with local research institutes in African countries, including Monsanto and the Kenyan Agricultural Research Institute (KARI) on virus resistant sweet potatoes, and Pioneer Hi-Bred and the Egyptian Agricultural Genetic Research Institute (AGERI) on Bt maize (Greenpeace 2002:5). USAID partnered with the Ministry of Agriculture to start AGERI in 1990 (Krauss 2004). Along with USAID, European funding agencies DFID

and DANIDA sponsor the Nairobi-based African Agricultural Technology Foundation (AATF), a public-private partnership designed to encourage the expansion of GM crops into Africa (Robinson 2004; Kalibwani et al. 2004:44). The Ugandan government has announced a new national agricultural research system that permits the private sector to compete for agricultural research funding against the National Agricultural Research Organisation (NARO), the previous state monopoly (Nakaweesi 2004). USAID and the Rockerfeller Foundation are amongst funders of a new biotechnology research laboratory at NARO (Clarke 2003).

In Southern Africa, the Regional Biosafety Programme is a USAID sponsored programme with private sector partners including Monsanto and Pioneer Hi-Bred. USAID's Agricultural Biotechnology Support Project (ABSP) has established a partnership with seven Southern African Development Community (SADC) countries - Malawi, Mauritius, Mozambique, Namibia, South Africa, Zambia and Zimbabwe - to provide technical training in biosafety regulatory implementation (Mayet 2003). USAID, with Cornell as the lead institution, have initiated ABSP II, the second phase of the project, to develop and deliver transgenic crops organised through 'product commercialisation packages' that assist in packaging and marketing GM technology (Kalibwani et al. 2004:44). The project is initially focusing on Kenya and Uganda in East Africa and Nigeria and Mali in West Africa. The USAID sponsored Program for Biosafety Systems (PBS) assists in biosafety research, policy and capacity, including in East and West Africa[9] (ISNAR 2003). The ISAAA, a biotechnology support organisation funded by USAID and a number of biotech corporations, already has a programme for developing commercial genetically modified crops in Kenya, and plans to extend into Tanzania and Uganda (Kalibwani et al. 2004:45).

Not only USAID and the biotech companies, but also the international agricultural research centres organised under the Collaborative Group on International Agricultural Research (CGIAR) are party to the biotech agenda. In Nigeria, the International Institute of Tropical Agriculture (IITA), a CGIAR affiliate, together with USAID and the Nigerian government started a 'major biotech capacity building programme' at the end of 2003 called the Nigeria Agricultural Biotechnology Project (IITA 2003). In East and Central Africa, the national agricultural research centres of 10 countries have a regional organisation called the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA) with a biotechnology working group. The group is still in the process of developing a fundable project proposal (Kalibwani et al. 2004:43).

In 1998 African governments adopted a model law on the 'Protection of the rights of local communities, farmers, breeders and regulation of access to biological resources'. Amongst its core principles are the right and responsibility to keep seed free; prior informed consent to use

[9] African partner organisations include African Biotechnology Stakeholders Forum (ABSF; Kenya), Association for Strengthening Agricultural Research in East and Central Africa (ASARECA; Uganda), East African Regional Programme and Research Network for Biotechnology, Biosafety, and Biotechnology Policy Development (BIO-EARN; Uganda), *Le Conseil Ouest et Centre Africain pour la Recherche et le Developpement Agricoles* (CORAF; Senegal) and national agricultural research organisations.

biological resources; local community access to gene pools; and no patents on life forms (Kalibwani et al. 2004:41).

Despite all this activity, the International Cotton Advisory Committee (n.d.) recognises that "because of the diversity of cotton growing problems throughout the world, there is no simple approach for transfer and implementation of biotechnical knowledge. Thus, many of the cotton growing problems of the world will not receive required attention"…by biotechnological responses, it should be added. Other fields of knowledge also have a role to play in responding to the problems of cotton growing.

CONCLUSION

The US is trying to head-off African criticism of its cotton subsidies by talking about helping to improve productivity, through Bt cotton. In the meantime, it is reorganising its domestic subsidy regime to comply with the WTO while attempting to limit the actual reductions it will make.

Nevertheless, in preparation for the future reduction of cotton subsidies, the industry is the process of globalising its operations, especially through the consolidation of corporate trading interests and firming its grip over input supply. The dominant states are fully behind this agenda through using their power to force open markets in developing countries, either through the WTO or through imposing conditionalities for bilateral trade preference. The World Bank is playing a crucial role in justifying the dismantling of state-run and single channel cotton export systems, regardless of how well they are functioning. Dominant states are also providing support for the maintenance of the corporate stranglehold over input supply, especially seed, by assisting in establishing mechanisms for the protection of intellectual property rights and by funding research agendas that favour the interests of transnational seed and biotechnology companies.

Contamination is not just a risk, it is THE mechanism, combined with patents, through which the industry will impose its agenda. This accounts for the push for the early introduction of the commercial planting of GM crops, knowing full well that once they are in the ground it will be impossible for states to reject them. Bt cotton is on top of the list because of the greatest likelihood of commercial success in the shortest time. Once the cotton is in the ground, the floodgates for future GM varieties are opened.

Given this multi-pronged attack on African cotton systems, it is recommended that African producers and governments reject the introduction of GM cotton, and the accompanying utilisation of existing agricultural infrastructure and institutions for the insertion of GM cotton into their systems. More sustainable alternatives to GM cotton exist. Poverty is multifaceted, cutting across economic, social and political systems and cannot be eliminated or reduced through the imposition of a single technological fix that itself is encoded within a system of increasing inequality. Poverty reduction is more feasible if based on the redistribution of existing resources, including secure access to land, water and locally available genetic material than if based on a single technology reliant on a vast array of external inputs only made available on the basis of payment.

Pest management techniques that rely on increasing producers' knowledge and integrating farmers' own knowledge with environmentally sustainable best practices from elsewhere are preferable to the introduction of technology that draws pest management away from direct control by the producer.

Instead of privatising agricultural institutions and focusing on biotechnology that places control in the hands of distant experts working for giant corporations, research and development could become more participatory, allowing producers to determine their own needs whether for the global market or not. In particular, dedicated support for the production of food and fibre for local need first and only then for exchange should be encouraged.

Primary producers, farm workers and the landless ultimately need to organise themselves to press for their own demands. A rejection of the imposition of GM crops and the associated political and institutional restructuring is imperative in this regard.

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