INTEGRATED SEED SECTOR STATUS IN SOUTH AFRICA

1.0 Reflections on the evolution of the integrated seed sector – historic development, drivers for change and what the future entails

Commercialisation of the seed trade was initiated with marketing of open-pollinated populations in the 1940s. Kalahari Early Pearl is one of these populations, and it is still being marketed today. The first hybrid was introduced in 1949, and by the 1980s, there was widespread adoption of maize hybrids. Development of the seed industry in SA can be attributed to the setting-up of organisations that would act as voices in the interest of the sector. The first representation of the seed industry was in the 1940s, when the seedman association of South Africa (SASA) was launched. The first seed legislation was established in the 1960s, and it was followed by reorganisation of SASA, to form the SA Plant Breeders Association, SA Hybrid Maize Organisation, SA growers association, and the SA Forage Seed Association.

Developments in the maize industry paved the way for other crops. After the setting-up of a Maize Board in the early 1950s, three American Breeders were contracted to start a maize breeding program. This was followed by appointment of an additional three South African national breeders. A number of private seed companies invested into research and breeding of maize hybrids. Such early companies included SABI, Dawie Schoeman and Pioneer SA (now Pannar). By the end of the sixties, the private breeding industry for grain and cereal crops was well established in SA. The Department of Agriculture supported the seed industry by supplying germplasm and releasing varieties that would be marketed by private seed companies.

During the 1970s, negotiations started between different crop specific associations, leading to formation of an umbrella organisation called ANSO (Association of National Seed Organisations). Seed quality control had been formalised during the 1950s, with the establishment of national seed testing laboratories. Seed testing services were privatised during the 1970s, leading to formation of the Association of SA seed analysts (ASASA). The plant improvement Act was introduced in 1976 (Act no. 53 of 1976), and this contributed to the rationalisation of seed certification. This was then followed with incorporation of all players in the seed industry into SANSOR (South African Seed Organisation). To date, SANSOR represents all role players who are in the South African seed industry. It is a member of the International Seed Testing Association (ISTA; from 1955), and the International Union for the Protection of New Varieties of Plants (UPOV; from 1977), etc.

Today, South Africa is largely self-sufficient in seed requirements. SANSOR regulates the seed industry through various acts embodied in the seed legislation. These acts include Plant Improvement Act, Agricultural Pests Act, Plant Breeders’ Rights Act, Agro-Chemicals, Fertilizers and Animal Remedies Act, and the Genetically Modified Organisms Act of 1997. The seed industry is characterised by intense competition involving 70 seed companies, cooperatives and farmer seed merchants, as well as over 500 distributors and agencies. This ensures that there are fair seed prices, maintenance of quality standards, and continuous introduction of new, improved varieties. Agronomic field crops dominate the seed market with a share of about 70 %, with horticultural species 21 %, and forage/pastures 9 %.

Public institutions that are mostly involved in plant breeding research include the Agriculture Research Council (ARC) and the Council for Scientific Industrial Research (CSIR). ARC has
several crop-specific institutes, such as the Grain Crops institute, and the Vegetable and Ornamental Plant Institute (VOPI), and they use both conventional and modern breeding techniques. CSIR is mostly using different applications of biotechnology. For example, they are currently in the process of generating transgenic maize and millet with resistance to fungal diseases.

Genetically modified (GM) varieties constitute one of drivers that are influencing change in South African Agriculture. Field trials of GM crops started in 1992. The first commercial release of GM varieties was in 1997. To date, insect-resistant (Bt) cotton and maize as well as herbicide-tolerant (RR) soya-beans, cotton and maize have been commercialised. Community Based Seed Production (CBSP) has been initiated in a number of provinces. In the case of maize, partnerships between CIMMYT and ARC have resulted in the availability of stress tolerant maize OPVs, which are being widely promoted. Farmers are producing seed of these varieties for personal use and for sale. This has also resulted in promotion of the informal seed sector. In future, biotechnology and CBSP will have a strong influence on the seed industry. Partnerships between the private and public sector will have to be increased if quantum leaps in development of the industry should be expected.

2.0 Current strengths and weaknesses in terms of knowledge and capacity building in Plant Breeding and Seed Production

2.1 Weaknesses

The national Rural and Development survey of 2001/02 painted a picture of ageing and shrinking scientific population, with the higher education sector dominated by white males, with relatively few blacks and women. The current situation of education in South Africa still provides systemic and institutional barriers that contribute to the problem of few students doing Mathematics and sciences, therefore limiting the pool from which to train, nurture and prepare future scientists. Innovation by the Department of Agriculture has resulted in mobilization of resources being invested in professional training of scientists and in assuring the development scientific research capacity.

Although many Universities are training plant breeders, there is a growing trend of students opting for biotechnology. Conventional breeding is therefore likely to be negatively affected by lack of professionals if this trend continues. The present low profile of plant breeding can be ascribed to globalization of breeding, the poor image of the future of successful crop production and the perception that plant breeding is not a rewarding profession. There is therefore need to ensure that continued training of breeders so that in future, both conventional and modern plant breeding can complement each other in developing new plant varieties.

Seed production has mostly been concentrated in the commercial sector. With the introduction of CBSP, it has become apparent that there are very few seed inspectors in the for homelands, for example, where SH farmers are starting CBSP. Amongst SH farming areas, the largest number of inspectors can be found in Limpopo, and they are completely absent in the Eastern Cape. This creates a necessity train as many inspectors and samplers as possible.
Numerous surveys have indicated that the SH farming sector is dominated by elderly farmers, in some instances those who are over 60 years. If this generation of farmers goes, there will be a big knowledge and experience gap, which will affect food security at the household level. There is therefore a need to come up with ways of encouraging young people to come into farming, and possibly have a wide variety of short practical courses that can help them to improve their skills.

2.2 Strengths

The Agricultural initiative of resource mobilisation has resulted in development of a number of institutions and associations that are focused on grooming young scientists. Associations like South African Plant Breeders Association (SAPBA) have realised that there is crisis as far as the future is concerned, the major crises being the small number of plant breeders entering the profession, and the large numbers of professionals leaving it, especially when they have reached retirement age. SAPBA has taken the initiative of attracting different stakeholders involved in plant breeding, the likes of training institutions, funders and potential employers, both public and private. Through this initiative we have seen training institutions training quite a number of young breeders. The public employer also came up with an occupation specific dispensation, which is a post and salary structure for scientists, and is aimed at improving salaries of scientists. This was done through the minister of public services and administration, in terms of section 3(3)(c), read with section 5(4) of the public service act, 1994 resolution 3 and 5 of 2009. It is hoped that this will attract youngsters to become scientists.

Other strengths include having numerous institutions of scientific excellence, such as CSIR, various institutes of ARC, Universities, etc. Some of these institutions are well resourced in terms of infrastructure and equipment. If fully staffed, quality training and/or cutting edge research can be conducted by some of these institutions.

3.0 Identify the drivers that have impacted national food security over the last few decades and what future drivers for change may be.

Advances in different disciplines of agriculture have influenced food security in South Africa over the past few decades. Such disciplines include soil science, agronomy, entomology, pathology, seed science, plant breeding, etc. As a result of sustained plant breeding activities, South African farmers have access to over 3600 plant varieties, including those that are not on the official variety list. These include grain crops, pasture crops, ornamentals, vegetables and fruit species. Use of elite varieties is critical for farmers to obtain high yields, and hence improved food security. Presence of numerous seed companies in SA, which has resulted in so many varieties, can be attributed to seed related legislation, which for example, enabled companies to protect their varieties through application for plant breeders’ rights. It also goes without saying that SA’s membership to international organizations such as ISTA and UPOV also contributed to our present status of food security.

Adoption of GM varieties has also contributed to food security immensely. In 2009, the area under GM crop production equaled 2, 2 million hectares, which represented a total of 12.2% of the total arable land in SA. This area was grown to 129 different GM crop varieties. Relative to the total production area reported for 2009, the adoption rate for GM maize was 78%; GM soybean was 85% and GM cotton between 92-95%. Cumulative benefits (income
gain) to farmers for the period 1998 to 2009 for GM maize, soybean and cotton crops in SA have been estimated at US$ 500 million. Biotechnology and bioinformatics present us with unlimited opportunities for incorporation of critical traits in crop plants. These two research areas will continue to be major drivers towards eradication of poverty and enhanced food security. For instance, they could help in improving the quality of food stuffs, which consumers and various other stakeholders are now more concerned about.

Affordable seed of some stress tolerant varieties is also becoming more readily available in the SH sector. Community Based Seed Production (CBSP) of maize and dry bean was initiated in the Limpopo Province, and this involves farmer-preferred varieties that tolerate numerous abiotic stresses such as drought, low soil pH and low soil fertility. The seeds are marketed after being treated, packaged and labeled according to certification requirements. Farmers who are participating in this project are currently making 800 USD per ton, which is significant if we consider that they used to receive 80 – 150 USD from selling maize grain. Free State and KwaZulu Natal and Eastern Cape (EC) provinces have also initiated CBSP.

The Department of Agriculture is the main custodian to see to it that food is available to all people at all times. Because of the number of agricultural institutions coming into being and luring experience personnel out of public agricultural institutions, Department of Agriculture had no choice but to come up with strategy forming stakeholder consortium in order to cast its net wide open to have everybody on board in trying to have an impact on national food security. An example of such a partnership is between the Department of Agriculture and Water for Food Challenge Program (WFCP), which by itself managed to put together research institutions like ARC, CIAT, CIMMYT, ICRISAT, IWMI and many more institutions with the aim of improving food security, incomes and livelihoods of smallholder farmers through integrated crop, water and soil fertility enhancing options.

The main objectives of this were to: Delineate agro-ecological recommendation domains in the smallholder dry-land areas based on biophysical and socio-economic factors, such as socio-economic stratification of smallholder communities and households. Collate baseline information of the domains, to be used as entry points to improve crop water productivity at the field level, livelihood strategies, market opportunities, and for targeting of technology, monitoring of project benchmarks, as well as validate and adapt integrated cereal and legume crop variety and soil management practices that are suitable for resource poor smallholders in a risk-prone environment. These technologies will aim to diversify cropping and livelihood options, maximize crop water productivity, and increase incomes from rain-fed farming systems. There is also a thrust to use innovative research and extension methodologies that are linked to public-private partnerships, to facilitate promotion and uptake of management options and strengthen linkages to input and product markets. Strengthening of public-private partnerships that will create income opportunities and improve crop productivity.

Future drivers for change will include any efforts that will succeed in bringing together organisations that will adapt their food security approaches to climatic change. For instance, the ARC entered into partnership with the African Agricultural Technology Foundation (AATF). The project they are working on involves drought tolerant genes that were made available to AATF royalty free, for the benefit of SH farmers in different parts of Africa. The project is called WEMA (Water efficient maize for Africa). Trials of these maize varieties are on-going, and they are expected to enhance food security in areas that are presently prone to
drought, and those where droughts are going to be more frequent due to climate change. For areas that are expected to experience flooding in SA, crops that can tolerate excessive water will have to be introduced, and some research efforts will have to be designed in that direction. Conservation agriculture is also recognized as a mitigating strategy against climate change. Its adoption is expected to increase. Breeding efforts will also have to develop varieties that will do well under conservation agriculture. The domestic market for organic agriculture is also expanding in SA, which will also necessitate breeding and seed systems related improvements aimed at this type of agriculture.