

NATIONAL POLICY ON PLANT IMPROVEMENT

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1. INTRODUCTION

Plant improvement is an important element of agricultural production in South Africa and other countries across the world. It involves a broad range of activities including, selection, breeding, trade control and all other related matters. Plant improvement is a rapidly changing industry with new technologies improving production efficiency - even under conditions initially perceived as being totally unsuitable for any form of crop production.

Plant improvement has been practiced for thousands of years. Many of the well known agricultural crops originated from domesticated varieties taken from the wild. In prehistory, human forebears in various parts of the world brought into cultivation a few hundred species from the hundreds of thousands available. In the process they transformed elements of these species into crops through genetic alterations that involved conscious and unconscious selection, the differential reproduction of variants. Through a long history of trial and error, a relatively few plant species have become the mainstay of agriculture and thus the world's food supply. This process of domestication involved the identification of certain useful wild species combined with a process of selection that brought about changes in appearance, quality, and productivity. The exact details of the process that altered the major crops is not fully understood, but it is clear that the genetic changes were enormous in many cases. In fact some crop plants have been so changed that for many of them, their origins are obscure, with no extant close wild relatives.

Plant improvement refers to the scientifically based identification of genetically superior plants and using them to improve the production of crops in the interest of the country and its people. It literally refers to the genetic alteration of plants to satisfy human needs. It is based on plant breeding as well as the regulatory framework to promote the use of good quality propagation material and well the trade thereof. Plant improvement emphasises the critical role of improved seed as an input to reduce crop losses and production costs, increase productivity, and improve incomes of farmers. Government has the primary responsibility to ensure that adequate and timely supplies of high-quality seed are available to farmers at reasonable prices.

Plant improvement practices have included simple selections based on the needs of humans to sustain themselves, classical plant breeding techniques, and more recently genetic engineering. The last century has seen improvements been made for specific traits such as improved quality, increased yield, increased tolerances to environmental pressures (eg. drought), disease resistance and insect resistance

While the green revolution placed a great deal of emphasis on the importance of agricultural inputs for increased production, the quality and genetic integrity of plant propagating material still remains the most critical building blocks in the

production chain and ultimately food security. Without access to superior quality starting material for cultivation, the perfect environmental conditions and maximum agricultural inputs cannot ensure an abundant quality harvest. This is of particular relevance in South Africa where inherent challenges regarding the availability of natural resources, such as arable land and water, is restricted. Plant improvement must therefore encourage optimal and sustainable production practices on already limited resources through the use of good quality planting material of varieties that are best suited to their growing environment.

For several thousand years, farmers have been altering the genetic makeup of the crops they grow. Human selection for features such as faster growth, larger seeds or sweeter fruits has dramatically changed domesticated plant species compared to their wild relatives. Remarkably, many of our modern crops were developed by farmers through many years of trial and error. Plant improvement gained a lot from the work of Gregor Mendel who is regarded as the father of genetics and plant breeding. Major advances in plant breeding followed the revelation of Mendel's discovery. Breeders brought their new understanding of genetics to the traditional techniques of self-pollinating and cross-pollinating plants. The art of recognizing valuable traits and incorporating them into future generations is very important in plant breeding. Breeders have traditionally scrutinized their fields and traveled to foreign countries searching for individual plants that exhibit desirable traits.

In the twentieth century plant breeding developed a scientific basis, and crop improvement was understood to be brought about by achieving favorable accumulations and combinations of genes. Taking advantage of known genetic diversity could facilitate this, and appropriate combinations were achieved through recombination brought about by the sexual process (hybridization). Furthermore it was possible to move useful genes by special breeding strategies. Thus a gene discovered in a wild plant could be transferred to a suitable adapted type by a technique known as the backcross method. A sexual hybrid was made, followed by a series of backcrosses to the desirable (recurrent) parent, while selecting for the new gene in each generation. After about five or six backcrosses, the offspring resembled the recurrent parent but contained the selected gene.

A number of genetic techniques were developed and refined in twentieth-century breeding, such as improved techniques to search for and store increased genetic variability, different techniques to develop variable populations for selection, and improved methods of testing to separate genetic from environmental effects. The exact details of the process for crops necessarily differed among naturally cross-pollinated plants (such as maize) and naturally self-pollinated plants (such as soybean or tomato) as well as those plants in which vegetative propagation (usually cross-pollinated) permitted the fixing of improved types directly.

Government and all other stakeholders have an important role to play regarding plant improvement. These ranges from development and maintenance of infrastructural and public service support services required to maintain efficient seed supply, create farmer demand for improved cultivars, and create an operating and economic environment favorable for investment in plant improvement. This policy is intended to guide the actions of government, private sector, farmers and other stakeholders in plant improvement matters. The policy is intended to support agricultural development, improve employment and the national economy, and ensure adequate food supply.

2. PURPOSE AND OBJECTIVES

The policy is aimed at providing a broad framework for supporting and regulating the production and trade of propagation material and related matters in order to support government's commitment to food security, job creation and economic development.

The purpose of this policy will supported by the following strategic objectives:

- Guide the content, meaning and intent of all provisions of all legislation that relate to propagation material.
- Support the development and use of improved cultivars.
- Support and promote breeding programmes.
- Promote fair trade in propagation materials.
- Promote and support the identification, evaluation, breeding and use of genetically superior propagation material to improve the production and performance of crops used for food, shelter, fibre and raw material for the manufacturing sector.
- Broaden participation by a broad range of stakeholders in the plant improvement sector.

3. PRINCIPLES OF PLANT IMPROVEMENT

Plant improvement is based on the following principles:

3.1 CULTIVAR DEVELOPMENT

Cultivar development is important for plant improvement. Crops, unlike animals, stay in one place and are therefore at the mercy of the environment in which they find themselves. As a consequence they have evolved complex genetic systems

which enable them to cope with, and adapt to, changes in the environment in order to complete their life cycle. Since the environment changes according to geography and season, a given variety will perform differently from place to place and season to season. That is to say the phenotype of a given crop genotype (or cultivar) can vary markedly according to its interaction with the environment. Farmers are concerned with the yield of the crop phenotypes that grow in their fields, whereas plant breeders are seeking to improve the genotypes of their cultivars. This apparent paradox is resolved by testing their newly created genotypes in a wide range of environments and over a number of years before finally selecting and releasing a new cultivar. Breeders of a range of crops in most agricultural environments have devised technologies for crossing and testing that have achieved the success referred to above. In the excitement of the tremendous advances in genetics across all organisms it is important not to forget the role of the environment in crop performance and that food comes from successful phenotypes.

The selection of naturally occurring variants is the basis of crop improvement. Over thousands of years this technique resulted in the development of modern basic crops. The discovery of techniques for asexual (vegetative) propagation, such as by using natural offshoots, rooting stem cuttings, or various grafting techniques, made it possible to "fix" genetic variants. This was the technique used for many tree fruits, enabling identical plants to be cultivated in orchards. Naturally produced seedlings derived from intercrosses of these selected plants were then available for selection again. Many present-day fruit crops are similar to those cultivated in antiquity, and some ancient selections are still cultivated—dates, for example. As humans carried improved crops to new locations, opportunities opened to increase genetic variation from natural intercrosses with new wild populations. The selection process was unconscious in many cases.

3.2 CONSERVATION, UTILISATION, AND CHARACTERISATION OF GERMPLASM

Food and agriculture production are dependent on genetic resources domesticated elsewhere and subsequently developed in other countries and regions. Continued access to plant genetic resources and a fair and equitable sharing of the benefits arising from their use, is therefore essential for food security.

Plant genetic resources are the biological basis of food security and, directly or indirectly, support the livelihoods of every person on Earth. Plant genetic resources for food and agriculture (PGRFA) consist of diversity of seeds and planting material of traditional varieties and modern cultivars, crop wild relatives and other wild plant species. These resources are used as food, feed for domestic animals, fibre, clothing, shelter and energy. The conservation and sustainable use of PGRFA is necessary to ensure crop production and meet

growing environmental challenges and climate change. The erosion of these resources poses a severe threat to the world's food security in the long term.

3.3 IMPROVING THE EFFECTIVENESS OF BREEDING METHODS

Plant breeding is the art and science of changing the genetics of plants in order to produce desired characteristics. Plant breeding is defined as identifying and selecting desirable traits in plants and combining these into one individual plant. Plant breeding can be accomplished through many different techniques ranging from simply selecting plants with desirable characteristics for propagation, to more complex molecular techniques.

Plant breeding has been practiced for thousands of years, since near the beginning of human civilization. It is now practiced worldwide by individuals such as gardeners and farmers, or by professional plant breeders employed by organizations such as government institutions, universities, crop-specific industry associations or research centers. Scientists and plant breeders believe that breeding new crops is important for ensuring food security by developing new varieties that are higher-yielding, resistant to pests and diseases, drought-resistant or regionally adapted to different environments and growing conditions.

Classical breeding relies largely on homologous recombination between chromosomes to generate genetic diversity. The classical plant breeder may also make use of a number of *in vitro* techniques such as protoplast fusion, embryo rescue or mutagenesis (see below) to generate diversity and produce hybrid plants that would not exist in nature.

Traits that breeders have tried to incorporate into crop plants in the last 100 years include:

- Increased quality and yield of the crop
- Increased tolerance of environmental pressures (salinity, extreme temperature, drought)
- Resistance to viruses, fungi and bacteria
- Increased tolerance to insect pests
- Increased tolerance of herbicides

Modern plant breeding may use techniques of molecular biology to select, or in the case of genetic modification, to insert, desirable traits into plants. Application of biotechnology or molecular biology is also known as molecular breeding. Modern facilities in molecular biology have converted classical plant breeding to molecular plant breeding.

The following are the major activities of plant breeding:

- Creation of variation
- Selection
- Evaluation
- Release
- Multiplication
- Distribution of the new variety

4. STATUS REPORT OF PLANT IMPROVEMENT IN SOUTH AFRICA

Plant improvement in South Africa is primarily regulated by the Plant Improvement Act, 1976 (Act No. 53 of 1976). The scope of this legislation strictly addresses aspects of plant improvement relating to the physical and physiological quality and varietal purity of plant propagating material utilized and traded in South Africa. National plant improvement requirements and activities as prescribed by legislation are aligned with those of international standard setting bodies to which South Africa is a member. These include: the International Seed Testing Association (ISTA) which ensures the uniform application of standard procedures and techniques for sampling and testing of seed; the International Union for the Protection of New Varieties of Plants (UPOV) which prescribes guidelines for the recognition and evaluation of plant varieties; and the Organization for Economic Co-operation and Development (OECD) Seed Schemes which provide guidelines for monitoring seed quality, varietal identity and varietal purity during the seed certification process. The adoption of these international standards by South Africa has allowed it to maintain the high standard of production of good quality plant propagating material for both the national and international market.

While the Act's regulatory role in the agricultural industry remains critical, current review of this legislation indicates that the scope of the Act is not entirely aligned to the current policy framework within which the agricultural sector now operates. As outlined in the Integrated Growth and Development Plan for Agriculture, Forestry and Fisheries the focus shifted to creating an enabling environment for sector that is accessible and inclusive of all participants irrespective of the size of their contribution to the sector. This is to be achieved through the provision of efficient and appropriate services via its various agricultural support programmes and improved regulatory systems. It is within this framework that plant improvement activities should be recognized to provide support to strengthen existing commercial production while simultaneously improving the participation of new entrants and facilitating small scale farmers to make the transition to mainstream agriculture.

The policy therefore aims to support the review of the Plant Improvement Act, 1976 (Act No. 53 of 1976) in light of the DAFF's objectives to improve its regulatory environment. It intends to promote awareness of plant improvement activities and services in order to eliminate skewed participation and inequity in the sector. It aims to improve the availability of good quality seed and other propagating material for planting thus ensuring access to sufficient, safe and nutritious food. By creating an understanding of the importance of utilizing quality plant propagating material the policy can contribute positively to the socio-economic upliftment of limited resource farming households. Also this policy takes cognizance of developing agriculture's important role not just nationally but also regionally and supports initiatives for harmonization in both SADC and Africa.

5. PROBLEM STATEMENT

The quality and genetic integrity of plants and plant propagating material is regulated by the Plant Improvement Act, 1976 (Act No. 53 of 1976) and related Certification Schemes. While this regulatory system has ensured a sustainable supply of good quality plants and plant propagating material it is not exempt from challenges. These are summarized as follows:

5.1 OLD AND OUTDATED LEGISLATION

The Plant Improvement Act, 1976 (Act No.53 of 1976) came into effect in March 1976 and the regulations commenced in 1980. The Act has been in existence many years but has not kept abreast of continuing changes in the agricultural sector. Alignment with the Constitution of the RSA has to be checked for any discrepancies.

The Plant Improvement Act and subsequent regulations were formulated to regulate aspects of the trade in plant propagating material for cultivation purposes and only applies to species that are declared in terms of the Act and viewed as economically important. The Act makes provision for the registration of seed sellers, cleaners, packers and prescribes minimum requirements for premises and minimum quality standards for plants and plant propagating material. The act also makes provision for a national variety list, a voluntary certification system for certain crops, requirements for labeling of containers and aspects dealing with imports and exports. It also provides for the registration of laboratories involved in quality and health testing of plants and propagating material.

While the Act aims to promote an environment for the orderly trade and utilization of only superior quality plant and propagating material, a workshop held to review the Act highlighted several key issues:

5.2 LIMITED SCOPE

The scope of the Act is limited to kinds of plant declared in terms of the Act that were economically important at the time of the legislation's commencement. No provision has since been made to review the existing list of declared crops and to determine the feasibility of including other crop types that have the potential to become economically important or to serve as an alternative source of nutrition. Furthermore, there are no guidelines prescribing the requirements and procedures for new or other kinds of plant to become declared in terms of the legislation. When new or other kinds of plant have been declared, the challenge is to develop standards to regulate them. The Act and associated regulations do not make provision for ensuring the quality of propagating material that is retained for the following year's planting i.e. farm-saved seed.

5.3 PENALTIES AND ENFORCEMENT

Non-compliances in terms of the Act are not dealt with effectively within the legislative framework and can be attributed to non-deterrent penalties and inadequate enforcement. A further challenge is the necessity for adequate human resource capacity with the relevant technical expertise to ensure effective implementation, compliance and monitoring in terms of the Act.

5.4 COMMERCIAL GMO VARIETIES

With the advent of plant improvement technologies such as Genetic engineering, the specific introduction of value adding characteristics into plants has seen improved plant varieties being generated at a faster rate than conventional plant breeding systems. The Act has taken cognizance of these developments and currently provides for the variety listing of commercially released GMO varieties in South Africa. However, issues around labelling of GMO propagating material are not clear and may need further consideration.

5.5 HARMONIZATION WITH OTHER NATIONAL LEGISLATION

Apart from the PIA, 1976 there are several other pieces of legislation influencing the regulation of plant and plant propagating material. In the interest of harmonization, the amendment of the Act and implementation of the plant improvement policy should give consideration to the following legislation:

A. Plant Breeders Rights Act, 1976 (Act No. 15 of 1976)

The PBR Act provides for a system through which plant breeders' rights relating to varieties of certain kinds of plants may be granted and registered; for the requirements which have to be complied with for the granting of such rights; and for the protection of such rights. Essentially the Act protects the Intellectual property rights of breeders/ persons who have bred or developed new varieties of plants and enables the holders of such rights to collect royalties for the use of the newly developed variety by other persons. The granting of PBR's for new varieties directly affects the trade and variety listing of these protected varieties in terms of the Plant Improvement Act, 1976.

B. Genetically Modified Organisms Act, 1997 (Act No. 15 of 1997)

The GMO Act provides for measures that ensure that all activities involving the use of genetically modified organisms (including importation, production, release and distribution) are conducted in a manner that limits potential risks to the environment, human health, animal health and plant health. The approval of GMO crops for commercial release will require that they meet the quality and varietal purity standards prescribed in terms of the Plant Improvement Act, 1976.

C. Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)

The Act provides for control over the use of natural agricultural resources in South Africa in an effort to promote the conservation of the soil, water resources and vegetation and the combating of weeds and invader plants. The strict regulations applied by the Act in terms of weeds and invader plants directly impacts the regulations of the PIA, 1976 as it relates to requirements for the presence of prohibited weed seed.

D. National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)

The Act provides for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998 (Act No. 10 of 1998). The Act prescribes requirements for the following categories of living organisms: alien species, listed invasive species, and threatened or protected species. The PIA, 1976 will have to be harmonized with the provisions of the Biodiversity Act, 2004, particularly as it relates to activities for plant species that are subject to regulation by both Acts.

E. Agricultural Pests Act, 1983 (Act No. 36 of 1983)

The Act provides for measures by which agricultural pests, including weeds and invaders, may be prevented and combated by import regulations and regulation

of economic important diseases. The PIA should contain cross reference to this legislation.

F. Agricultural Product Standards Act, 1990 (Act No. 119 of 1990)

This Act provides for specifications and quality standards for agricultural products, both for the local and export markets. There is a strong link between this Act and the PIA especially relating to variety names of fruit crops.

G. Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947)

This Act provides for the registration of fertilizers, farm feeds, agricultural remedies, stock remedies, sterilizing plants and pest control operators; to regulate or prohibit the importation, sale, acquisition, disposal or use of fertilizers, farm feeds, agricultural remedies and stock remedies. Treatment of seed by coating and/or covering with chemicals is affected by this Act.

5.6 MINIMUM REQUIREMENTS

Minimum physical and physiological requirements as prescribed by the Act relating to quality aspects such as germination, purity, weed seed content and prohibited insects etc. need to be revised and upgraded in order to maintain a standard of quality for plant and plant propagating material that is acceptable, competitive and will promote the trade thereof nationally as well as internationally. These requirements must also align itself with the prescripts of other national legislation and South Africa's obligations in terms of its membership to international bodies such as ISTA, OECD.

5.7 NATIONAL CERTIFICATION SCHEMES

Section 23 of the Act makes provision for the establishment of national certification schemes for the various plant kinds declared in terms of the Act. The main objective of the certification schemes is to ensure the availability of certified propagating material that is in compliance to more stringent quality and plant health requirements as opposed to the minimum requirements of the Act. Each Certification Scheme is administered by a designated authority appointed by the Minister. Certification schemes include: The SA Seed Certification Scheme that is administered by the SA National Seed Organization (SANSOR); the SA Seed Potato Certification Scheme that is administered by the Independent Certification Council for Seed Potatoes; the Deciduous Fruit Plant Certification Scheme that is administered by the Deciduous Fruit Plant Improvement Association; and the SA Plant Certification Scheme for Wine Grapes that is administered by the Vine Improvement Association. Designated certification authorities are responsible for managing the certification process and ensuring that its members engage in certification activities according to scheme requirements.

With regard to certification schemes, the department has an obligation to monitor and audit the scheme's activities and assess whether the objectives of each of the schemes are still being met. As yet, no terms of reference are available to clearly define the obligations of designated authorities towards DAFF and *vice versa*. Participation in all certification schemes is voluntary. This has hampered the issue of penalties against scheme members who have willingly transgressed the rules of the scheme. Currently the national schemes are also geared towards participation by the commercial farming sector either as buyers of certified material or producers of certified material. An urgent effort is therefore needed to look at ways of introducing the small scale agricultural sector to certification.

5.8 SKEWED PARTICIPATION AND ACCESS TO PLANT IMPROVEMENT ACTIVITIES AND SERVICES

Agriculture in South Africa can be categorized into the established commercial sector and the developing small scale sector. National plant improvement legislation aims to promote the use of superior quality plant and propagating material by all participants of the agricultural sector. In practice however, it is largely still the commercial producers who actively participate in regulated plant improvement activities and benefit from the availability of good quality propagating material. While it is imperative that the existing gap between the emerging and developing sectors be bridged, in order to address national goals of poverty alleviation, economic growth and employment, it cannot be done in isolation at the national level. Currently there is little or no interaction and co-ordination amongst the different spheres of government regarding plant improvement matters. As a result the emerging sector has limited information and access to national plant improvement services such as seed testing, sampling, variety listing and certification. This places the quality of propagating material used by the emerging sector at risk of not complying with national standards resulting in the production of inferior products. Also, there is a lack of available awareness material on the main role players of plant improvement in SA. Access to information on the legislative requirements for plant and plant propagating material is limited to the internet and departmental websites.

5.9 INSTITUTIONAL CHALLENGES

The aim of ensuring the use of superior quality plant propagating material needs to be re-enforced by the support of a competent and efficient inspection, seed testing and variety control services. The implementation of these respective regulatory services is carried out by support personnel across several directorates. The fragmentation of support personnel has given rise to new challenges such as poor coordination amongst offices, poor communication between divisions and in some cases inconsistent enforcement of the regulations.

5.10 STAKEHOLDER CONSULTATION CHALLENGES

While there is no national authority on plant improvement matters, technically related issues are discussed at formal meetings of designated certification authorities where industry stakeholders are also represented. Because the scope of plant improvement in South Africa covers a wide range of crops and activities, the challenge would be to institute a platform whereby stakeholders can provide feedback on national issues affecting plant improvement as well as relate their experiences on services provided in terms of the regulatory environment.

5.11 HARMONIZATION OF PLANT IMPROVEMENT STANDARDS

South Africa has an important role to play within Africa when it comes to the trade of various agricultural commodities. This includes the trade of seed for agriculturally important food crops. The challenges in this respect are specifically related to the different national regulatory requirements for seed which hinder the distribution and movement of seed between countries in the SADC region and Africa.

6 KEY POLICY INSTRUMENTS

The challenges facing the plant improvement sector will be addressed through the following policy instruments:

6.1 REPLACEMENT OF THE CURRENT LEGISLATION

The intended regulatory outcomes of the Plant Improvement Act of 1976 is to positively support the availability and use of good quality plant and plant propagating material in South Africa. However given the fact that the legislation is outdated and have several loopholes, a decision had been taken to replace the existing legislation with a new one. This is geared towards achieving a regulatory framework that is clear, user friendly, effective and aligned to the national goals of government, with the following amendments to be made:

- (i) The scope of the Act will have to be reviewed in order to take cognizance of developments in Agriculture over the last decade. The current list of declared plant kinds and varieties includes most of the economically important agronomic, horticultural and cereal crops, thus ensuring the national food supply. To encourage the production of alternative crop types in support of niche markets, breeding of new varieties and changing dietary preferences the list of plant kinds should be revised. The revision should also include the development of a guideline for the declaration of plant kinds.

The farmer's privilege principle in accordance with the Plant Breeders' Rights Act, acknowledges the rights of farmers to retain farm-saved seed strictly for their own re-use. Harmonization is required in terms of the Plant Improvement Act, 1976 through the inclusion of an appropriate definition for farm-saved seed. In the interest of plant improvement, the regulation of this activity should make provision for the cleaning / processing of farm-saved seed only at cleaning / processing facilities that are registered in terms of the Act, except where the cleaning/ processing of farm-saved seed is conducted by the farmer on his or her property. The regulation of farm-saved seed in this manner promotes the potential of the seed to meet the minimum requirements of physical purity and germination as prescribed by the Act and is in support of sustainable seed breeding programmes.

- (ii) The minimum requirements as it relates to plants and plant propagating material must be reviewed. A study should be conducted on prohibited weeds and prohibited insects that affect the quality and health status of propagating material in South Africa. These results will facilitate the inclusion of an updated prohibited weed seed and insect list in the Act and subsequently prevent the inadvertent spread of invasive weeds and high risk pests or diseases. An investigation should also be conducted to determine the feasibility of introducing physical testing for disease presence, specifically where visual observation of disease symptoms is not possible.

The existing minimum quality standards for germination, physical purity and viability of seed should be revised in order to improve the standard and raise the quality of our national seed supply. Since the Act prescribes minimum standards for an extensive list of seed crops, the revision will be a joint exercise between industry stakeholders and government, based on technical and scientific data.

- (iii) To strengthen enforcement of the Act, stricter penalties that are more deterrent and relevant to the current judicial environment must be incorporated in the legislation to facilitate the prosecution of offenders.
- (iv) The appointment of designated authorities to administer certification schemes on behalf of the Minister is still viewed as the most cost effective solution based on limited capacity within the Department. However, the relationship between designated authorities and DAFF should be properly institutionalized in the form of an agreement that clearly outlines the obligations of either party in ensuring an effective certification system in South Africa. A review of certification schemes will have to be undertaken in order to address difficulties relating to the voluntary nature of scheme, the provision of deterrent penalties and the possibility of introducing the principle of zoning to designate specific areas for the production of specific crops. The review of the certification schemes will also have to consider

how to extend participation in the schemes to the small scale farming sector in the interest of technology transfer and economic growth. This should be achieved either within the framework of existing certification scheme regulations or by the establishment of specialized schemes for community-based seed production or nursery plant production in support of increasing production yields and household income of the informal sector.

- (v) The requirements of the PIA, 1976 need to be harmonized with other national legislation regulating plants and plant propagating material. The list of declared plant kinds in the Act will be amended to comply with the list of invasive species proposed for the draft regulations of the Biodiversity Act, 2006. In order to align the PIA with the Plant Breeders' Rights Act, provision will need to be made for the Farmer's Privilege principle first introduced in the 1991 version of the UPOV Convention. Since the recognition of varieties also includes commercially released GMO varieties, traceability and labelling issues should be clarified in terms of the requirements of the PIA, 1976. Streamlining of procedures and requirements will be necessary for harmonization with the Agricultural Pest Act, 1983, in particular the import requirements for plant propagating material.

6.2 TEST LABORATORIES

The Official Seed Testing Laboratory (OSTL) is responsible for all seed testing services in terms of the PIA, 1976. For regulatory purposes, seed testing and sampling is used to monitor and evaluate the quality of seed being traded for export and local use. South Africa has been a member of the International Seed Testing Association (ISTA) since 1955 and since 1998 the OSTL has enjoyed recognition as an internationally accredited ISTA laboratory. The international accreditation status maintained by the OSTL has allowed SA to export seed internationally with the assurance of an ISTA quality certificate, guaranteeing the quality of the seed and confidence in the seed testing and sampling techniques used. Apart from the OSTL, there are 18 other company or private seed testing laboratories. These laboratories are registered in terms of the PIA and are allowed to test seed for their own purposes, certification purposes and for remuneration. While a good registration system has already been established amongst the seed testing laboratories and the OSTL, this process needs to be formalized by way of documentation. In particular a seed testing standard needs to be put in place for the national registration of labs. The regulatory function of seed testing services is not possible without the support of the official seed samplers. However, these services are provided by sampling officials stationed at regional offices throughout the country. There is a need therefore to synchronize activities between the OSTL and official samplers on a regular basis to ensure effective service delivery and monitoring.

Other test laboratories, namely testing for diseases and for biological qualities are also required to register in terms of the PIA. Since the initial registration of

laboratories was for seed test labs, the regulations do not provide specifically for these laboratories. Testing standards have to be introduced and specifications drafted for labs other than seed test labs.

The ISTA Rules is the basis on which seed testing is conducted in South Africa, not only by the ISTA accredited OSTL, but also the nationally registered private or company laboratories, thus ensuring reproducibility and quality in seed testing. The development of a national seed testing standard based on the relevant ISTA standard will promote confidence in the quality of South Africa's seed supply for national and international trade. To facilitate standardization of services between the OSTL and official samplers, formal discussion sessions should be held in the form of annual workshops or regular meetings. ISTA also provides standards for seed health testing which should be introduced as standard for registered health test laboratories.

6.3 NATIONAL CERTIFICATION SCHEMES

The current legislation makes provision for the establishment of national certification schemes for the various plant kinds declared in terms of the Act. The main objective of the certification schemes is to ensure the availability of certified propagating material that is in compliance to more stringent quality and plant health requirements as opposed to the minimum requirements of the Act. Each Certification Scheme is administered by a designated authority appointed by the Minister. Certification schemes include: The SA Seed Certification Scheme that is administered by the SA National Seed Organization (SANSOR); the SA Seed Potato Certification Scheme that is administered by the Independent Certification Council for Seed Potatoes; the Deciduous Fruit Plant Certification Scheme that is administered by the Deciduous Fruit Plant Improvement Association; and the SA Plant Certification Scheme for Wine Grapes that is administered by the Vine Improvement Association. Designated certification authorities are responsible for managing the certification process and ensuring that its members engage in certification activities according to scheme requirements.

With regard to certification schemes, the department has an obligation to monitor and audit the scheme's activities and assess whether the objectives of each of the schemes are still being met. As yet, no terms of reference are available to clearly define the obligations of designated authorities towards DAFF and *vice versa*. Participation in all certification schemes is voluntary. This has hampered the issue of penalties against scheme members who have willingly transgressed the rules of the scheme. Currently the national schemes are also geared towards participation by the commercial farming sector either as buyers of certified material or producers of certified material. An urgent effort is therefore needed to look at ways of introducing the small scale agricultural sector to certification.

6.4 MANAGEMENT AND ADMINISTRATION MATTERS

Activities conducted in the interest of plant improvement are extensive and not all of them are regulated. Regulated activities include certification, trade, variety registration, cleaning, packaging, and quality testing of plant propagating material. Thus management and administration of the legislation and all related matters is critically important. The Registrar of Plant Improvement is responsible for management and administration of the legislation. The Registrar will be supported by technical as well as administrative staff.

Since these activities encompass a wide range of stakeholders and expertise, specific working groups might be required to address and resolve plant improvement issues of national urgency and relevance. The working groups will be comprised of the registrar, technical support staff and the relevant stakeholders. This will enable plant improvement issues to be addressed in a co-ordinated and efficient manner and simultaneously provide a platform for stakeholders to give direct feedback on regulatory services provided by DAFF.

6.5 HARMONIZATION OF STANDARDS

Due to South Africa's membership with international standard setting bodies such as ISTA, UPOV and OECD it is critical that national plant improvement requirements are always aligned to international standards. By maintaining these international requirements SA will retain its advantage of being an international competitor in the trade of plant propagating material.

The Southern African Development Community (SADC) constitutes an important trading partner for South Africa particularly, with regard to the trade of seed. As a leader of agricultural development in the region it is important that South Africa supports and participates in initiatives towards harmonization of seed certification and accreditation in view of promoting trade amongst SADC countries and within Africa. Harmonization of seed regulations within the SADC region should however, not compromise national legislation and policy.

6.6 CAPACITY BUILDING AND DEVELOPMENT OF HUMAN CAPITAL

Training and capacity building forms the basis for human resource development to address skill shortage, to enhance competitiveness and wealth creation of the plant improvement sector. Enhanced training of farmers is of critical importance for improved production, and increased global competitiveness of the sector. The training programmes include aspects from propagation until post-harvest handling practices. Length of training shall be determined by the needs of targeted groups. Training and capacity building would involve the following:

- Training programmes

- Mentorship programmes.
- Refocusing and re-orientation of curricula of training institutions in line with the needs of the country (both universities and colleges).

For effective regulation of plant and plant propagating material and to ensure high levels of compliance, legislation must be supported by an efficient evaluation and monitoring system. Currently implementation of the regulatory system relies on the support of human capacity in other line function directorates. This creates further challenges when it comes to implementation. It is therefore required that the supporting role of line function directorates be clarified in terms of responsibilities, delegations and channels of communication and that these arrangements be documented. Relevant training of human resource capacity is critical to ensure that the competency levels and expertise are maintained and that service delivery is achieved in line with departmental objectives. To ensure that the standard of services for seed testing, seed sampling and varietal evaluations is upheld in terms of international standards and principles prescribed by ISTA and UPOV, it is important that technical capacity be strengthened through exposure and participation in the activities of these standard setting bodies.

6.7 INVESTMENT IN RESEARCH AND TECHNOLOGY DEVELOPMENT

Development of the plant improvement sector depends a great deal on development of new technologies. The technologies range from breeding of new varieties, control of pests and diseases, water conservation technologies, amongst others. Research is a critical element in the development of new technologies. This goal would be achieved through the following actions:

- Commissioning targeted breeding programmes.
- Supporting development of appropriate cultivars for all regions in South Africa.
- Development and improvement of niche products.
- Risk mitigation.
- Promotion of partnerships between ARC, CSIR, universities and international research centres.
- Mitigation against climate change.

6.8 AWARENESS PROGRAMMES

Many studies and surveys had shown that farmers and other stakeholders are not well informed about the principles and the benefits of plant improvement. In order to broaden the information available about plant improvement, it is important that objective and reliable information is made available by government and other stakeholders. Information campaigns about the principles, the practices and the environmental and other benefits of plant improvement should be established. They should target consumers as well as farmers, but also

operators in the processing industry, retailers, large-scale kitchens as well as schools. Support is required from the Provinces and other government departments.

These programmes are aimed at raising awareness levels of both farmers and other stakeholders about plant improvement. The programmes would be based on all plant production systems. They would also be aimed at promoting the image of South African plant improvement sector. These programmes would ensure that technologies aimed at improving production are promoted and adopted by the farming communities. The awareness programmes would also assist consumers to make informed choices when buying products that are said to be organically produced. Nation-wide professional promotion of high quality propagation material is necessary to increase awareness. Collaboration between organizations and alliances in promotional activities or campaigns has been identified by market analysts as an important strategy. Food processors and retail businesses are target groups for promotion, since they are important actors in the supply chain.

Critical policy actions are:

- Development and implementation of multi-year and country-wide information and promotion campaigns aimed at informing consumers, public institutions, schools and other key actors in the food chain about the merits of plant improvement.
- Launch tailored information and promotion campaigns to well-defined types of consumers such as the occasional consumer and public canteens.
- Development and implementation of a website dedicated to plant improvement.

In order to facilitate increased participation in plant improvement activities, awareness material must be developed and appropriately distributed. Promotion of the legislative requirements and services can be further enhanced by involving Provincial Departments of Agriculture in the distribution and accessibility of information. The small scale agricultural sector should also be encouraged to engage in plant improvement activities such as seed production, cleaning, packing, propagation and selling of plant propagating material, which could generate income as well as uplift the quality and standards of seed and plant material being distributed and utilized by the informal sector.

6.9 SUPPORT SCHEMES FOR FARMERS

An important means of promoting production is to eliminate existing constraints that discourage new entrants. The government should use various incentive schemes to support the development of this sector and its farmers.

Critical policy actions are:

- Setting up of dedicated support systems at both national and provincial levels.
- Development and implementation of special incentive schemes for resource poor farmers.

7 INSTITUTIONAL ARRANGEMENTS

A National Advisory Committee on Plant Improvement will be established. Activities conducted in the interest of plant improvement are extensive and not all of them are regulated. Regulated activities include certification, trade, variety registration, cleaning, packaging, and quality testing of plant propagating material. Since these activities encompass a wide range of stakeholders and expertise, specific working groups are required to address and resolve plant improvement issues of national urgency and relevance. The committee will be comprised of the registrar, technical support staff and the relevant stakeholders. This will enable plant improvement issues to be addressed in a co-coordinated and efficient manner and simultaneously provide a platform for stakeholders to give direct feedback on regulatory services provided by DAFF.

8 MONITORING, EVALUATION AND IMPACT ASSESSMENT

Monitoring and evaluation need to be implemented with a view to assessing the potential impact of policy in priority setting and planning; reviewing the performance and quality of various outputs and assessing the relevance of research programmes and their ultimate outcomes and impacts on research and development objectives.

All national research programmes should contain clear elements of monitoring and evaluation (M&E) and impact assessment (IA) before approval. The challenge is to institutionalise M&E and IA as management tools for managing and assessing efficiency and cost-effectiveness of investments in research and development and technology transfer.

The success of the Agricultural R&D Strategy in providing continued funding and promote long-term research is dependent not only on individual programmes, institutions and infrastructure, but also on interacting "portfolios" of programmes. It is also important to evaluate how national funding of Agricultural R&D programmes interfaces with private sector behaviour, provincial research activities and regional and foreign investment on agriculture research and

development. Therefore, appropriate monitoring processes and evaluation methods should be developed that take into account the complexities of multiple levels of decision making and interdependent science programme portfolios. This should be done by developing a set of system indicators that are monitored periodically and used to revitalize the system.

ANNEXURE A: DEFINITIONS

Breeder Seed: seed of the first generation of seed multiplication, produced under the direct control of the breeder and/or his assigned representative.

Certified Seed: seed produced from multiplication of foundation seed.

Cultivate: to grow plants and care for plants with a view to the propagation or multiplication of plants or propagating material; and “cultivation” has a corresponding meaning.

Commercial Seed: seed or planting material which is offered for sale, sold, advertised, or entered into marketing channels.

Field Inspection: inspection of the growing plants in the field by a qualified inspector, following specific procedures, for the purpose of determining the varietal purity of a seed crop, plants affected by diseases or pests, presence of undesirable plants, and general condition of the seed crop.

Foundation Seed: seed generation obtained from reproduction of breeder seed, and meeting all requirements and standards.

Hybrid Seed: seed produced by the first generation obtained from crossing parental forms.

Insect Pests: insects or other invertebrates injurious to plants and plant products.

Plant Diseases: fungi, bacteria, nematodes, and/or viruses which are injurious to plants and plant products, and the pathological condition in plants and plant products caused thereby. This definition shall also include plants which are parasitic or partially parasitic on other plants.

Post-Control Plots: process of identifying the variety of seed by planting .grow-out plots. in the field and subsequent identification of the variety and genetic purity of the progeny as it grows in the field.

Propagating material: any material of a plant that can be used for the propagation of a plant

Seed: botanical seed or other parts of crop plants which are used for reproduction purposes.

Seed Lot: a determined and specifically identified quantity of seed which are covered by one set of documents.

Scheme: a scheme established in terms of section 23 of the Plant Improvement Act, 1976 (Act No. 53 of 1976)

Test laboratory: a laboratory where plants and propagating material are tested, examined or analysed in respect of any physical or biological property thereof or the occurrence thereon or therein of pathogens or insects, for reward

Varietal list: the list kept in terms of section 15 of the Plant Improvement Act, 1976 (Act No. 53 of 1976)

Variety: any plant grouping within a single botanical taxon of the lowest known classification.

ANNEXURE B: ACRONYMS AND ABBREVIATIONS

DAFF:	Department of Agriculture, Forestry and Fisheries
GMO:	Genetically Modified Organism
ISTA:	International Seed Testing Association
OECD:	Organization for Economic Cooperation and Development
OSTL:	Official Seed Testing Laboratory
PIA:	Plant Improvement Act
PBR:	Plant Breeders' Rights
SADC:	Southern African Development Community
SANSOR:	South African National Seed Organization
UPOV:	International Union for the Protection of New Varieties of Plants