

Measuring Private Research & Innovation in South Asia

&

Sub-Saharan Africa

A South Africa Country Report

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Acronyms

AFMA	Animal Feed Manufacturers Association
ARC	Agricultural Research Council
ASTI	Agriculture Science and Technology Indicators
CGIAR	Consultative Group on International Agriculture Research
CRI	Citrus Research International
DWAF	Department of Water Affairs and Forestry
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GMOs	Genetically Modified Organisms
GWK	Griqualand West Cooperative
ICFR	Commercial Forestry Research
MAP	Marketing of Agricultural Products
MFP	multifactor productivity
MGK	Magaliesberg Grain Cooperative
NAMC	National Agricultural Marketing Council
NTK	Northern Transvaal Cooperative
NWK	North West Cooperative
ORI	Oceanographic Research Institute
R&D	Research and Development
RPO	Red Meat Producer's Organisation
SAAMBR	South African Association for Marine Biological Research
SAFCL	South African Forestry Company Ltd
SAPPI	South African Pulp and Paper Industry
SASCP	South African Society of Crop Production
SASRI	South African Sugar Research Institute
SFRI	Sea Fisheries Research Institute
SMRI	Sugar Milling Research Institute
SSA	Sub-Saharan Africa
SSK	Sentraal-Suid Koöperasie

Executive summary

It is well known that private firms have in recent years taken on a larger stake of agricultural research and development (R&D) in South Africa as a result of the Agricultural Research Council's declining research performance, which is attributable to poor funding and management and the departure of researchers. However, the extent of private sector engagement in agriculture R&D is still unknown as data quantifying private sector agricultural R&D is limited. To address this data limit, this study identified 51 private firms in eight major subsectors that carry agriculture-related research activities. It gathers primary data using a semi-structured questionnaire pertaining to research personnel, research expenditure, thematic and crop focus, and innovations and technology licensing by these private firms. However, due to the large number of non-responses, the proportion of industry covered was only 37%.

The study found that aggregate total research expenditure from five subsectors increased consistently from R164 million in 2001 to R329 million in 2008, yielding a twofold increase over the seven-year period. Similarly, the number of research staff (in terms of head count) also increased by more than 25% from 158 in 2001 to 201 in 2008. It was evident that most private agriculture firms in South Africa have formed partnerships with foreign multinational companies and operate as subsidiaries of these overseas companies. As such, the majority of 'innovations' is either imported or adapted and distributed under license from international firms or parent companies. Therefore most of the agricultural research done by the private sector is largely adaptive or done for testing purposes and to comply with the regulatory authorities. This emerged as a major constraint in the data gathering process in that most firms operate under international agreements and could not make available the requested data.

The government policy initiatives that have the most influence on the participation of the private sector in South Africa's agriculture R&D are the deregulation of the agriculture input and product markets and the liberalization of agricultural trade, which has increased the spill-in of agriculture technologies to South Africa. Some impediments that also call for government attention still exist, such as the need for government to ease the stringent phyto-sanitary restrictions and the need for government to revise and update its policies regarding Genetically Modified Organisms (GMOs) in order to enable local research firms to adopt GMO technologies.

Key words: Private sector agriculture R&D, innovations

Introduction

This report on South Africa is part of a collaborative study conducted in eight different countries on "Measuring Private Agricultural Research and Innovation in South Asia and Sub-Saharan Africa (SSA)". According to available summary statistics and economic indicators, South Africa is one of the biggest and wealthiest countries in SSA (Earthtrends, 2003). In 2008, it had a total land area of 1.2 million square kilometers and a population of about 49 million people. The same year, its Gross Domestic Product (GDP) was estimated to be R2770 billion (World Economic Forum, 2009). The country consists of a dual agriculture sector in which both large-scale and subsistence farmers co-exist. Since 1994, when the agriculture sector was deregulated, there has been significant restructuring of agribusiness in South Africa, with most agriculture cooperatives transforming into private companies. Consequently, the private sector plays a vital role in South Africa's agriculture not only in terms of production, processing and marketing but also, more recently, in performing agriculture research. Previous studies estimating Agriculture Science and Technology Indicators (ASTI) for 2000 have shown that the private sector contributes only 3% of the country's research and development (R&D) spending. However, on account of the large number of non responses, the figures in these surveys indicating the private sector's contribution to agricultural RD spending in South Africa is an undercount (Liebenberg *et al.*, 2004:8). Due to the Agricultural Research Council's declining research performance in recent years – largely as a result of poor funding, and the departure of well-qualified researchers – private firms have taken on a much larger stake of agricultural research in South Africa. The extent of this engagement is, however, unknown as data quantifying private sector agricultural R&D is limited and often not shared due to its confidentiality.

In order to get a better assessment of the private sector's role in agricultural research in South Africa, this study seeks to gather information pertaining to the nature and extent of agricultural research involvement by the private sector. The results of this study can help to enhance decision-making by government, donors, and investors, as well as to develop effective strategies and policies for agricultural growth.

Methodology

The study identified 51 private firms that perform agriculture-related research activities. These firms are categorized under eight major subsectors, namely: feed and livestock, seed and fertilizer, pesticides, forestry and fisheries, agriculture machinery, food processing and manufacturing, wines and spirits, and privately-funded research institutions. A survey was then conducted using a semi-structured questionnaire to gather data pertaining to research personnel, research expenditure, thematic and crop focus, and innovations and technology licensing by these private firms. Table 1 below shows the number of firms contacted by industry.

Table 1: Number of firms contacted by subsector

Agriculture subsector	Number of firms contacted	Number of firms with R&D and to whom questionnaires were distributed	Number of questionnaires returned
Feed and livestock	6	5	2
Seed and fertilizer	10	10	8
Agricultural chemicals	10	5	4
Forestry and fisheries	5	5	0
Agriculture machinery	2	0	0
Food & manufacturing	5	4	0
Wines and spirits	2	1	0
Research institutions	5	4	4
Agricultural cooperatives	7	1	1
Total	51	35	19

Source: Source: Own compilation from survey

In addition to collecting data through interviews and mail, information was also obtained from publicly available sources such as government reports and web sites. However, out of the 51 institutions that were identified and contacted, 35 firms participated in the survey and only 19 firms returned complete questionnaires. Therefore, only 37% of the industry was covered.

Description of South Africa's agriculture & agro-input and processing industries

Agriculture

South Africa has varied climatic regions ranging from Mediterranean to sub-tropical and semi-arid that allow for a well diversified agriculture, mainly consisting of field crops, horticulture, and livestock. In 2008, the livestock subsector, which accounted for 44% of agriculture output, consisted of approximately 13 million cattle and 28 million sheep (Liebenberg, 2010; SA Info, 2009). Crop production is estimated to cover only 13% of the country's total surface area. Water availability is the major limiting factor to crop production; about 1.3 million hectares of land are under irrigation. South Africa is self-sufficient in most major agriculture products, and in years when rainfall is abundant, the country emerges as a net food exporter. Agriculture exports account for approximately 7% of total South African exports. Major export crops include sugar, citrus, fresh grapes, maize, cotton, tobacco, and wine. Unlike most countries in SSA, South Africa's primary agriculture accounts for less than 3% of the country's Gross Domestic Product (GDP) and about 10% of employment. In spite of this, agriculture has significant backward and forward linkages into the economy and consequently a thriving agribusiness sector exists in which farm feeds, food processing, fertilizers, fuel, and other agricultural chemicals are core (SA Info, 2009). In 2004, primary production, agro-processing, and agriculture inputs together accounted for 15% of the country's GDP (Liebenberg *et al.*, 2004:2).

Liebenberg, Pardey, and Khan (2010) provide an in-depth analysis of South Africa's agriculture production and productivity trends over several decades. The following summarizes some insightful findings from their work. The structure of agricultural production and productivity in South Africa has changed significantly over the past few decades. First, agricultural output as a share of GDP has declined from about 10% in the 1960s to about 3% in 2007. Even though South Africa is still a net agricultural exporter, the ratio of agriculture exports to the country's total exports is much lower in recent years than in the 1930s, when agriculture exports as a proportion of the country's exports accounted for more than 70%. In 1993, when the country faced international sanctions related to apartheid, this share reached a low of 6.5% and slowly regained momentum, averaging around 8.2% after the turn of the millennium (Liebenberg, Pardey and Khan, 2010). In terms of production, there has been a significant shift in production from field crops to high value horticultural products (fruits and vegetables). While field crops' share of production value has declined from 40% in the 1980s to 30% between 2000 and 2007, horticultural crops' share of production value increased from 18% to 26% in the same period. This is perhaps due to increased trade liberalization and access to foreign markets. Wine and deciduous and citrus fruits have had remarkable growth rates—above 4% in the past decade. Similar to field crops, livestock's share of production value is also estimated to have declined from 55% in the early 1900s to about 44% in 2007. Overall, the average annual growth rate of total agriculture output has fluctuated from 1.86% in the 1940s to approximately 3.58% for the period 1950s-1970s. Between 1982 and 2000, the total annual agriculture growth rate declined to 1.52% per year, after which it regained momentum and has grown by about 2.1% per year since 2000. The increase in the total annual agriculture growth rate since 2000 is attributable to growth in horticultural products as opposed to field crops and livestock production, which grew by only 0.9% and 1.2% per year respectively between 1982 and 2008 (Liebenberg, Pardey and Khan, 2010). Though total agriculture growth per annum has improved since 2000, it is much less than the 3.58% per annum height reached in the 1950s. The country, therefore, is performing below its potential.

Despite the variation in total agriculture growth rate, crop yields in South Africa have been increasing. Between 1990 and 2008, maize yields increased by 4.58% per annum and wheat and sorghum yields increased by 3.34% and 3.03% per year respectively. The yield growth is mainly due to increased mechanization and a significant increase in the use of fertilizers, improved seed, and other chemical inputs. However, South Africa has had a declining multifactor productivity (MFP, measure of the changes in output per unit of combined inputs), growth rate. It dropped from 3.98% per year between 1971 and 1989 to 0.01% per year between 1990 and 2008. The lack of MFP growth in recent years is reason for concern and demands worthy investment options for agricultural R&D that ensure sustainable productivity growth (Liebenberg, Pardey and Khan, 2010).

Agro-input & processing industries

Farm feeds, seed, fertilizer and agro-chemicals, important intermediate inputs for agriculture production, are big business in South Africa. Total expenditure on agriculture intermediate inputs and services has increased from approximately R36 billion in 2003 to R67 billion in 2008 (Esterhuizen, 2006:193). In 2008, while farm feeds accounted for 22% of total agriculture input expenditure, fuel and fertilizer expenditure accounted for 20% and 13% of the country's total agriculture input expenditure respectively; farm services together with maintenance and repairs accounted for 19% of agriculture input expenditure. The other significant subsectors include agro-food processing, wines and spirits, forestry and fisheries, and, pertinent to this study, private institutions in the business of agriculture research products and services.

Feed & livestock

The South African animal feed industry dates back to the 1930's, when the first 5-tonne electrical feed mixer was installed by Lion Bridge in Pretoria (Animal Feed Manufacturers Association (AFMA), 2009). A number other organizations soon followed to contribute to the growth of this important agricultural subsector. Today, total national feed production is estimated to be roughly 8.5 million tons with a gross value of between R12 billion and R15 billion per annum (AFMA, 2009). The six institutions under the feed and livestock subsector are illustrated in Table 2 below. It is worth noting that the Red Meat Producer's Organisation (RPO) acts as a representative body in all matters affecting the red meat industry in South Africa. As such, the research performed by RPO is mainly social (as opposed to biological) research that involves gathering and distributing statistics regarding the red meat industry. The other feed firms are involved in developing and/or running trials for innovative feed and concentrate technologies.

Table 2: Name & research orientation of private firms in feed & livestock subsector

Name of Institution	Orientation of institution	Research activity
Red Meat Producer's Organisation (RPO)	Representative body in all matters affecting the red meat industry in South Africa	Gather, process, and distribute statistics, technical and other information regarding the red meat industry to government and other stakeholders
Rainbow Chicken	South African-based company involved in producing broiler chicken.	Involved in chicken breeding for optimal growth period and slaughter weights.
Epol	South African-based company and a division of Rainbow Chicken, involved in manufacturing balanced feeds, concentrates, and pre-mixes for local and other African markets	Primarily involved in the development of chicken feed, but also develops cattle, swine, sheep, dog, and ostrich feed.
AFGRI Animal Feeds	Operates feed mills and manages four additional business units that either support the feed mills or contribute towards product diversification.	Feeds are manufactured based on the current local/international technology. Feed trials are run in conjunction with protein producers and under an international technology agreement.
NOVA Feed	Innovative supplier of poultry, ostrich, dairy, and pig feed solutions to the agricultural sector in South Africa.	Feeds are all researched and tested on a commercial scale before market release.
NUTRI Feed	Manufactures and markets animal feed,	
Meadow Feeds	Manufactures and distributes animal feeds.	In-house chicken feed research and outsource other R&D activities.

Source: Personal interviews and URL home pages, 2009

Seed & fertilizer

The South African seed industry recorded an annual turnover of R2.5 billion in 2008/09 with winter and summer grain crops dominating the market and accounting for 74% of this turnover. Vegetable seed was estimated to contribute 16% and pasture/forage species and flowers accounted for 9% and 1% respectively (South African National Seed Organisation, 2009). In 2007, annual fertilizer consumption in South Africa was estimated to be 2 million tons (FSSA, 2008). The two major fertilizer manufacturing companies are Omnia and Sasol; each company has a market share of more than 20%. Fertilizer manufacturing uses both locally-produced materials (ammonia and phosphates) and imported components such as potash. Even though fertilizer imports into South Africa are duty free, only 20% of total fertilizer sales are imported (Kirsten and Gouse, 2002:3).

As is the case with agricultural input industries in Europe and the U.S., mergers and acquisitions have also affected the South African market. This happened in a unique way, which involves an increased role of international agribusinesses in acquiring or merging with local South African companies. As a result, the local seed industry today consists of multinational seed companies such as Pannar, Sakata, and Monsanto. Pannar has international partners in the U.S. and Argentina. Similarly, Monsanto also has a parent company in the U.S. and Europe, as does Sakata, Syngenta, Agricol, and Omnia. The South African seed and fertilizer companies also have a significant presence in the regional market with joint ventures in countries such as Angola, Kenya, Malawi, Mozambique, Zimbabwe, and Zambia. Other seed companies include Hygrotech and Starke Ayres, a subsidiary of Pannar. Starke Ayres and Hygrotech are specialists in vegetable and flower seed production; both are headquartered in South Africa with subsidiaries in other African countries. This subsector constitutes the bulk (eight) of the private firms under consideration in this study (Table 3). Regarding agricultural R&D, Pannar has five fully-equipped research stations in Southern Africa, another four research stations in the U.S., and one in Argentina.

The seed and fertilizer companies develop new products from their own research programs and by integrating products from their overseas partners. The products from overseas are scientifically tested locally, under controlled conditions and extensively in the field, to acquire registration and certification before being released on the market. The major seed technology research activities include plant breeding and the development of cultivars, and seed testing. In the field of biotechnology, techniques such as marker assisted breeding and gene mapping are incorporated in order to enhance conventional breeding programs.

Table 3: Name & research orientation of private firms in seed & fertilizer subsector

Name of Institution	Orientation of institution	Research activity
Pannar	Multinational seed producer.	Release of new cultivars, exchange of germplasm, and technology with various international partners. In biotechnology, new techniques (gene mapping, incorporation of trait specific genes into plants) are in order to enhance conventional breeding efforts.
Agricol	A seed company in agronomy crops (cereals, canola, hybrid sunflower) and alternative crops (forage seed).	High priority in seed technology, knowledge, and information dissemination.
Monsanto	Seed technology company with wide range of herbicides and biotechnology traits.	Seed cultivars, innovative biotechnology products and first-rate chemical products that offer crop protection.
Hygrotech	Vegetable seed company for vegetable crops in South and Southern Africa as well as internationally. Water soluble fertilizers for crop, foliar nutrient products and seedling productions.	Vegetable cultivars.
Sakata seed Southern Africa	Specializes in seed production, packet seed, vegetable, forage, turf and flower seed, vegetable breeding programs and specialized products for the home garden industry.	Plant breeding and seed laboratory for seed testing.
Starke Ayres	Supplies innovative, premium seed and associated products to professional growers/ home gardeners in South Africa and internationally.	Development of vegetable cultivars.
Syngenta	Leading agribusiness in seeds and crop protection. Invests in research and field development, manufacturing and supply, and sales and marketing in both areas.	Biological development of new products, label expansions, crop programs, and crop solutions. Ensures sound registrations to minimize any form of risk to the users and the environment.
OMNIA	Omnia is a diversified, specialist chemical services company. Produces dry, liquid, and specialty fertilizers, and has production plants throughout South Africa.	Laboratory chemical research, greenhouse fertilizer research and offers the expertise to support clients.
SASOL	An integrated energy and chemicals company. Sasol's chemical cluster manufactures fertilizers, wax, solvents, and other chemicals	Uses new technology to produce plastics and other products as well as research into production of cleaner fuels.

Source: Personal interviews and URL home pages, 2009

Agro-chemicals

This subsector consists of large international companies (with subsidiary operations in South Africa and elsewhere) that are in the crop protection business and thus manufacture and distribute herbicides, insecticides, pesticides, and other crop protection, and animal health products. In 2009, the South Africa agro-chemicals industry was valued at R3.1 billion (Avcasa, 2010). South Africa imports the bulk of raw materials from foreign multinational parent companies, but the final products are manufactured/formulated in South Africa with the appropriate licensing. The six agro-chemical companies that were contacted for this survey are Bayer Cropscience, Dow Agrosciences, Philagro South Africa, BASF South Africa, Sipcam, and Chemtura Corporation (Table 4). Research efforts in these South African-based subsidiary companies are mainly directed towards performing on-farm trials and testing new products developed by the foreign parent companies before releasing these products onto the local market (personal interviews, 2009).

Table 4: Name & research orientation of private firms in agro-chemical subsector

Name of Institution	Orientation of institution	Research activity
Bayer Cropscience	Innovative crop science company in the area of crop protection, nonagricultural pest-control (Environmental Science), seeds, and plant biotechnology (BioScience).	Agrochemicals based research and biotechnology.
BASF South Africa	BASF South Africa and Sub-Sahara has several local areas of expertise including, agriculture and plant biotechnology. Agriculture products include fungicides, herbicides, plant growth regulators, rodenticides, and agcelence	BASF focuses on the five growth clusters: Energy Management, Raw Material Change, Nanotechnology, Plant Biotechnology, and 'White' Biotechnology. The Department "Science Relations and Innovation Management" coordinates collaborations with universities and research organizations
Chemtura Corporation	Chemicals business for agriculture and nonagricultural products. Chemtura agriculture products include insecticides, herbicides, fungicides, miticides, seed treatment products, plant-growth regulants, and fumigants	Seed treatment and miticides.
Dow Agrosciences	Involved in supplying and marketing quality crop protection products and technology.	Provides innovative technologies for crop protection, pest/ vegetation management, seeds, and agricultural biotechnology.
Philagro South Africa	Subsidiary of Japan based company Simitomo. Producer and distributor of plant protection chemicals (for grain, grapes, vegetables, and potatoes), animal feeds, and poultry growth enhancers	Conducts field trials and testing for Simitomo and other manufacturing companies.
Sipcam South Africa	Specializes in the production, marketing, and sales of plant protection products and chemical intermediates.	Biological Agriculture and modern crop protection programs are done.

Source: Personal interviews and URL home pages, 2009

Forestry & fisheries

South Africa has one of the largest cultivated forestry resources in the world with production worth R2.1 billion in 2008. The country's forestry plantations cover some 1.3 million hectares with pulp production of more than 9.5 million tons. In 2008, the net value addition of South Africa's forestry industry including processed products and was estimated R21.3 billion. The industry is a net exporter of wood, paper, pulp, and other products, contributing about 1% to the country's total GDP (Godsmark, 2009).

The three major organizations under the forestry subsector are: the South African Pulp and Paper Industry (SAPPI), Mondi, and the South African Forestry Company Ltd (SAFCOL). These organizations are based and headquartered in South Africa with regional offices in other continents of the world. Sappi and Mondi are the two largest pulp and paper manufacturing companies in South Africa, each owning 550,000 and 385,000 hectares of land respectively. Sappi has an annual production capacity of 6 million tons of paper and 3.3 million tons of pulp; Mondi generates 0.4 million tons paper and 0.9 million tons of pulp each year. SAFCOL operates through its subsidiary Komatiland, which was established in 2007 after the restructuring of commercial forestry assets of the then Department of Water Affairs and Forestry (DWAF). In forestry, the major research activities include growth and yield research, nursery research, biotechnology, and seed research. The research of growth and yield focuses on the mathematical quantification of tree and stand growth. Nursery research involves the ongoing development and improvement of existing vegetative propagation, and the regular testing and screening of growth mediums, fertilizers, pesticides, and fungicides. In biotechnology and seed research, plant tissue is manipulated using hormones to induce the required growth response and to produce seed with improved genetic quality.

Aquaculture is also one of South Africa's important subsectors. With a coastline that stretches some 3, 000 km, fresh and frozen fish is exported globally. The fisheries subsector is valued at R17 billion (SA Info, 2009). The Oceanographic Research Institute (ORI) is a major non-profit and non-government marine research institute and forms part of the South African Association for Marine Biological Research (SAAMBR). It has provided scientific services to various local and international marine resource management agencies for about 50 years and also functions as a research institute of the University of KwaZulu-Natal. ORI and the Sea Fisheries Research Institute (SFRI) and were contacted for the survey.

Agricultural mechanization

The South African agriculture machinery market is valued at R1.7 billion annually and is dominated by three major farm implements: tractors, planters, balers, and combine harvesters (SAAMA, 2009). South Africa has a limited capacity to manufacture agricultural machinery and implements; it produces only about 5% of the total number of tractors in the country. The bulk of agricultural equipments are imported mainly from the U.S. and China (Esterhuizen, 2006:194) and recently an increasing share from Argentina. Two major firms, AFGRI and Uniekum Landbou Masjiene, were included in the sample for the survey. AFGRI Equipment is South Africa's leading agricultural service provider and a supplier of new and pre-owned mechanization equipment tailored to the needs of agricultural producers and processors. AFGRI equipment also holds South Africa's largest franchise for John Deere sales, service, and parts supplies. It also owns John Deere franchises throughout Africa. It handles servicing and maintenance requirements on site to ensure the efficient management of an agricultural fleet. AFGRI also holds national agency agreements to provide farmers with diverse equipment from Rovic and Leers, Falcon Equipment, GC Tillage, Kongskilde, Dormas, and others (AFGRI, 2009). Similarly, Uniekum Landbou Masjiene

also serves as a marketing agent in South Africa for international companies. New Holland and John Deere machinery are imported into South Africa and are locally marketed by Uniekum Landbou Masjiene and other agribusinesses (personal interviews, 2009). According to Uniekum, agricultural machinery and AFGRI machinery, the players in agricultural mechanization only perform trials on behalf of international companies to assist in the development of machinery suited to South African conditions.

Food processing & manufacturing

Developing new products and improving existing products in the food and manufacturing subsector is traditionally the way that companies do business. Innovative and market research are therefore integral to firms in the food industry striving to produce brands that appeal to diverse consumer groups. The firms in the food and manufacturing subsector are shown in Table 5 below. Premier Foods, Tiger Milling Company, Pioneer, Foodcorp and the South African Breweries, each one of which has an annual turnover of more than R12 billion rand, are the primary producer and distributors of most of South Africa's consumer goods. These range from grains, flour, maize meal, bread, and alcoholic and non-alcoholic beverages. Interestingly, most of these firms are principally South African and have significant presence in other African countries. These firms' specific research activities include the fortification of products with vitamins and minerals, the development of new products, the quality assessment of raw materials (e.g. grain), and research on the potential use of new raw materials.

Table 5: Name & resource orientation of private firms in food & manufacturing subsector

Name of Institution	Orientation of institution	Research activity
Premier Foods	South Africa's Fast Moving Consumer Goods (FMCG) manufacturing and distribution companies. Its primary business is milling and baking, and manufacturing brands like Blue Ribbon, Snowflake Flour, and Iwisa Maize Meal.	Food innovation resulting in new products such as the Easy Mix range, the Creations range, and the Play Time range.
Tiger Milling Company	A branded fast-moving consumer packaged goods company. Deals in grains, beverages, snacks and groceries.	Improving brand products to meet consumer's expectations.
Pioneer	Production and distribution of a diverse range of food, beverages, and related products in Southern Africa. Focused on products for both human and animal consumption.	Focuses attention on the scientific enrichment of products with vitamins and minerals. New developments in grain research in terms of wheat quality, new cultivars, and test methods.
Foodcorp	Holding company for a group of businesses engaged primarily in the production, marketing and distribution of food. Products range from staple foods such as milled wheat, to delicatessens such as rock lobsters.	Products are supported by leading edge technology.
South African Breweries Limited	South Africa's leading producer and distributor of alcoholic and non-alcoholic beverages.	SABMiller's product innovation includes developing new low calorie products and researching the potential of new raw materials such as sorghum and cassava.

Source: Personal interviews and URL home pages, 2009

Private sector funded research institutes

This subsector is composed of privately-funded research institutions that perform agricultural related research activities. When conducting R&D, these private R&D institutions occasionally collaborate with public institutions. The five institutions that were included in the sample are: the South African Sugar Research Institute (SASRI), the Sugar Milling Research Institute (SMRI), the Institute for Commercial Forestry Research (ICFR), Citrus Research International (CRI), and the South African Society of Crop Production (SASCP).

The South African Sugarcane Research Institute (SASRI) is a prominent agricultural research institute that clusters its research in four multidisciplinary programs: Variety Improvement, Crop Production and Management, Crop Protection, and Systems Design and Optimisation. Research activities in the Variety Improvement Programme involve the development and release of varieties with sucrose, yield, pest and disease, agronomic, and milling characteristics that are desirable to both

millers and growers. The Crop Protection Programme works to minimize the effects of pests, diseases, and weeds on crop production; the objective of the Crop Performance and Management Programme is to enable the sustainable and profitable use of resources through efficient soil, water, chemical, and variety use in the production and delivery of quality sugarcane to the mill. The Systems Design and Optimisation Programme investigates and develops innovative systems that optimize crop production through modeling, technology design, and a farming systems approach (SASRI, 2009).

The Sugar Milling Research Institute (SMRI) specializes in both fundamental and applied research into all aspects of cane and sugar processing. SMRI, the central scientific organization involved in research work and technical services for the southern African sugar milling and refining industries, is registered as a non-profit company. It has several affiliated member mills in Swaziland, Mozambique, Tanzania, Malawi, Zimbabwe, and Zambia. SMRI's services include the development of efficient and cost-effective methods to recover sucrose from cane; detailed analysis of integrated mass, energy, and color balances for both raw houses and refineries; and the offering of expertise in process and equipment evaluation techniques, including data logging, strain gauge torque measurements, tracer tests, and Computational Fluid Dynamics (CFD) modeling (SMRI, 2009).

The Institute for Commercial Forestry Research (ICFR) develops technology and expertise in the sustainable growth of trees to benefit all stakeholders in plantation forestry in South Africa. Research is distributed among three multidisciplinary programs: tree improvement, re-establishment, and sustainable forest productivity. In addition, ICFR's nursery provides quality seedlings for applied research programs and offers a wide range of analytical testing services using its own laboratory or partner laboratories. The institute also facilitates industry-level collaborative research initiatives. The ICFR is a privately-funded forestry research institute that is directly financed by contributions from companies and organizations in the forestry industry including SAPPI, Mondi, York Timbers, Merensky, NCT forestry co-operative, and Komatiland (ICFR, 2009).

Citrus Research International (CRI) executes citrus research projects in all production areas of South Africa including surrounding countries such as Mozambique, Zimbabwe, and Swaziland. To maximize the long-term global competitiveness of citrus growers in southern African, it combines the various skills and strengths of all CRI Group partners to develop, co-ordinate, and provide all research and technical services (CRI, 2009). In 2007/2008, income from citrus in South Africa was estimated to be R5.3 billion (SA Online, 2009). Citrus research in Southern Africa is largely funded by levies on export cartons. Research is divided into four programs: crop and fruit quality management, cultivar development, disease management, and integrated pest management. Several projects within each program address specific problem areas identified by the citrus industry. Project Coordinators are in charge of research conducted within each project and this may be conducted at various institutions (CRI, 2009).

The South African Society of Crop Production is a crop science-based organization that promotes research, training, and technology transfer. The SASCP is involved in the science-based management of soils, crops, and the environment for long-term sustainable use. SASCP's institutional members include AFGRI, Bayer CropScience, the Fertilizer Society of South Africa, Monsanto, Pannar, the South African Sugar Research Institute, and many others. Its affiliated members are mainly higher learning institutions (SASCP, 2009).

Wine & spirits

The wine industry in South African is an important export industry consisting of large private vineyards and some large wine bottling companies. As a result, estimating market shares in this industry is extremely difficult. However, in 2008 the South African Wine Industry Information and System estimated the income from viticulture to be R2.9 billion (SA Online, 2009). It emerged that role-players in the wine industry rely on public R&D with research stations situated in the Western Cape Province, which is the primary wine production area. Distell is the leading producer of spirits in South Africa and was included in the survey.

Cooperatives

Seven agricultural cooperatives situated in all of the major agricultural areas in South Africa were contacted for the survey. These cooperatives include: North West Cooperative (NWK), Griqualand West Cooperative (GWK), Northern Transvaal Cooperative (NTK), Magaliesberg Grain Cooperative (MGK), SENWES, SSK, and South West Cooperative. Most of these cooperatives, however, serve as marketing and retail agents for producers and conduct little or no R&D.

Innovations

Our endeavors to establish the extent and nature of the agricultural innovations developed by private sector firms proved to be difficult given the limited information provided. We nevertheless managed to gather from respondents' information a number of innovations and patents from the respondents and these are all listed in Table 6 below. The majority of these 'innovations' is either imported or adapted and distributed under license from international firms or parent companies. This again confirms our assessment that most private sector agricultural research is largely adaptive or done for testing purposes and to comply with the regulatory authorities.

Table 6: Number & source of innovations

Name of Institution	New product/process	No. of specific innovations	Source of innovation
Agricol Pty Ltd	Sunflower	2	Licensed
	Maize	2	Licensed
	Oats	1	Licensed
	Reygrass	2	Licensed
	Seed processing	1	Own R&D
	Bird seed	1	Own R&D
	Barley variety	1	Own R&D
Hygrotech	Vegetable species	N/A	Own R&D
	Butternut	N/A	Licensed
	Tomatoes	N/A	Licensed
Starke Ayres (Pty) Ltd	vegetable species	40	Own R&D, licensed
Sensako	Wheat cultivars	30	Own R&D
Sakata Seed Southern Africa (Pty) Ltd	Squash F1 Atlas	1	Imported
	Squash F1 Pluto	1	Imported
	Pumpkin F1 hybrid	1	Licensed
	Sweet corn F1 hybrid	1	Licensed

	Tomato F1 hybrid	1	Imported
Pannar	Wheat and maize cultivars	N/A	Own R&D
Monsanto SA (Pty) Ltd	Maize hybrid 1	1	Own R&D
	Maize hybrid 2	1	Own R&D
	Maize hybrid 3	1	Own R&D
	Maize hybrid 4	1	Own R&D
	Maize hybrid 5	1	Own R&D
Philagro SA (Pty) Ltd	Insecticide	1	Imported
	Mosquito net	1	Imported
	Plant growth regulator	1	Imported
	Plant growth regulator	1	Imported
	Animal feed	1	Imported
Total South Africa (Pty) Ltd	Pesticide 1	1	Contract R&D
	Pesticide 2	1	Contract R&D
Afgri Animal Feeds	Feed	1	Licensed
	Amino acid	1	Imported
	Oil (Soya)	1	Imported
Rainbow Farms (Pty) Ltd	Enzyme 1	1	Imported
	Enzyme 2	1	Imported
	Processed food	6	Own R&D
	Pelleting	1	Imported
	Feed mixers	1	Imported
	SKOV equipment (Automatic bird and feed weigher)	1	Imported
	SKOV equipment (Setting climate controllers)	1	Imported
	Processing chicken	5	Own R&D

Source: Own compilation from survey

Research expenditure

This study defines total research expenditure to comprise staff remuneration, operating expenses, registration fees, and capital expenditure. It can be observed from Table 7 below that aggregate total research expenditure from the five subsectors increased consistently from R164 million in 2001 to R329 million rand in 2008, indicating a twofold increase over the seven-year period. Similarly, the number of research staff (in terms of head count) also increased by more than 25% from 158 in 2001 to 201 in 2008 (Table 8). The bulk of total research expenditure emanated from the seed and fertilizer subsector¹ while co-operatives accounted for the least share of total research expenditure.

¹ It was difficult to do a comparison across subsectors as the number of returned questionnaires (and firms) in each subsector varied.

Table 7: R&D expenditure by subsector & year

Subsector	Total research expenditure - Rand' million (2001-2008)							
	2001	2002	2003	2004	2005	2006	2007	2008
Seed and fertilizer	67.2	90.7	98.5	109.0	111.7	124.9	139.1	156.3
Pesticides	17.3	19.0	20.4	22.0	22.5	23.8	23.9	25.5
Feed and Livestock	4.5	8.3	8.2	9.1	11.2	10.7	11.3	13.1
Private Agricultural Research Institutes	74.8.3	75.0	78.8	83.8	106.9	108.5	122.1	133.0
Agricultural Cooperatives	0.6	0.6	0.8	0.8	0.8	0.9	1.0	1.0
Total	164.4	193.6	206.7	224.7	253.0	268.8	297.4	328.9

Source: Own compilation from survey and with adjustments from the South Africa ASTI survey of 2008 for years not provided by the respondents in this survey

Table 8: R&D personnel by subsector & year

Subsector	Number of research staff by Year (2001-2008)							
	2001	2002	2003	2004	2005	2006	2007	2008
Seed and fertilizer	81	84	86	92	96	98	96	95
Pesticides	6	6	6	6	7	7	6	6
Feed and Livestock	5	5	5	5	8	8	8	9
Agricultural Research Institutes	63	60	62	65	81	82	90	88
Agricultural Cooperatives	3	3	3	3	3	3	3	3
Total	158	158	152	171	195	198	203	201

Source: Own compilation from survey and with adjustments from the South Africa ASTI survey of 2008 for years not provided by the respondents in this survey

To reflect the extent of privately funded research, it is important to point out the extent to which farmers and commodity organizations in the agricultural industry in South Africa fund agricultural research provided by universities and the major public research body and public research provider, the Agricultural Research Council (ARC). This seems to be based in the declining government funding allocated to the ARC. These funds are extracted from the food supply chain via statutory levies paid by producers on each unit of a commodity delivered. The National Agricultural Marketing Council (NAMC) regularly conducts an annual review of all statutory levies implemented in terms of the Marketing of Agricultural Products Act, No 47 of 1996, (MAP Act). In their 2006 survey, they reviewed ten industries (citrus, cotton, dairy, deciduous fruit, dried fruit, potato, red meat, sorghum, wine, and winter cereal) that collected statutory levies. In 2006, these industry bodies collected a total of R149.1 million in statutory levies. The NAMC report shows that R60.4 million was spent on research by these organizations during 2006. The 2009 survey of the NAMC reports that R90.2 million of total levy expenditure was spent on research projects in the industries that collected levies. Some of the industries are undertaking or initiating their own research, but a major portion (R29 million) of the R90.2 million was made available to the Agricultural Research Council (ARC) to undertake research in the agricultural sector, in consultation with the industries concerned. The balance were allocated to other private and public research providers such as universities to do research on themes and programs prioritized by the industry and producer organizations. The spending on research by these producer organizations should be seen in the context of a total government allocation of R450 million to the ARC in the 2009/2010 financial year.

By way of illustration, we show how the Winter Cereal Trust distributes its levy income for agricultural research for the 2009/10 financial year. The trust has allocated R23,390,295 for wheat research, R2, 262, 874 for barley, and R318, 182 for oats research. The institutional allocation of this funding is documented in Table 9, which suggests an interesting mix between private and public research. Private funds generated by commodity organizations are in this case used to fund research in public and private institutions. This obviously complicates the picture of privately-funded research in South Africa, largely because not all commodity organizations are as transparent with their information as illustrated here. It should be remembered that the research investments reported here originate from investment and levy income and therefore the research expenditure by commodity organizations is considerable more than the R70 million reported earlier. For example, the Maize Trust alone spends annually around R100 million of its investment income from their trust endowment on maize related research.

Table 9: Institutional allocation of small grains levy income to different research providers (2009/2010)

Institution	Amount
<i>Wheat research</i>	
ARC Small Grains Institute	R11 856 420
University of Stellenbosch	R1 090 730
Department of Agriculture: Western Cape Province	R608 913
University of the Free State	R70 1655
SA Grain Laboratory	R1 505 510
Pannar	R1 425 558
Sensako	R4 796 882
ARC Plant Protection Research Institute	R275 872
University of Johannesburg	R111 200
University of North West	R36 000
Cen Gen	R26 010
<i>Barley research</i>	
ARC Small Grains Institute	R940 853
University of Stellenbosch	R235 700
SA Barley Breeding Institute	R1 187 262
<i>Oats research</i>	
ARC Small Grains Institute	R256 982
University of Stellenbosch	R61 200

Source: SA Grain February 2010

Key policies & investments

Public sector research & CGIAR

South Africa is in the midst of an era of declining public sector agriculture research investment, which has enhanced the need for establishing private-public partnerships (Njobe-Mbuli, n.d). Established in 1992, ARC is the country's major public

agriculture research institution. In 2000, it was South Africa's largest agriculture research institute, accounting for almost 60% of the country's agricultural research expenditure and researchers (Liebenberg *et al*, 2004). A consensus has recently been reached that the stake of private agriculture research in South Africa is increasing; the share of this stake is unknown, however, as studies into the role of the private sector are still underway. A new development is the funding and collaboration among the ARC and the various institutes of the Consultative Group on International Agriculture Research (CGIAR). This collaboration is essential for the sustainability of agriculture research; it is also likely that as institutional arrangements affecting agriculture research transform, the CGIAR will also collaborate with universities and the private sector. It is worth noting that there is collaboration within the private sector itself. More recently, Monsanto and BASF announced a joint project that integrates Monsanto's DEKALB maize seed with BASF's stress resistant AgCelence crop protection concept in order to increase effective yields and at the same time make use of available production capacity more effectively (Hofmeyr, 2010).

Government policies that affect research & innovation

The South African agriculture sector has undergone a series of policy reforms since 1994, when the country had its first democratic election. Apart from the continued effort in redressing the effects of discriminatory legislation, some of the major policy shifts that have occurred include (OECD, 2006): deregulating the marketing of agricultural products and liberalizing agricultural trade; enacting land reform policies and programs; eradicating certain tax concessions and reducing direct subsidies; and the introduction of a minimum wage for farm workers.

The major policies influencing the participation of the private sector in South Africa's agriculture R&D have been the deregulation of the agriculture input and product markets and the liberalization of the agricultural trade. Because the deregulation of agriculture markets, which entailed state withdrawal from and the dissolving of government marketing boards, the private sector has taken over the marketing of agriculture inputs and outputs. The active role of the private sector has attracted Foreign Direct Investment (FDI) from several multinational companies that have formed partnerships with local companies in manufacturing and distributing agriculture inputs (seed, fertilizer, agro-chemicals, and machinery) and outputs. This merge with foreign multinationals has increased the role of South Africa's private companies in performing agriculture research, particularly involving trials and the testing of new technologies' suitability to local conditions (as the development of technology occurs abroad). Similarly, progress made towards liberalizing agricultural trade by replacing direct controls over imports with tariffs, eradicating state controls over exports, and establishing preferential trade agreements have enhanced private sector involvement in agribusiness. Such new trade arrangements have increased South Africa's access to foreign markets in the export of sugar, citrus, fresh grapes, wines, maize, and other agricultural products. On the other hand, this has permitted the presence of foreign products on the domestic market. These products, some of which enter the country duty free, are mainly agriculture inputs, including agriculture machinery and equipment, fertilizer components, and agro-chemicals. Trade liberalization has therefore increased the spill-in of agriculture technologies in South Africa, and has resulted in research that is biased towards testing the suitability of foreign products as opposed to developing new products.

However, despite the remarkable progress made by the government through these policy initiatives, some impediments still exist that also call for government attention. Most of the firms that participated in the survey cited the need for government to ease the stringent phyto-sanitary restrictions for the shipment of maize seed from South Africa to the U.S.

and other foreign destinations to facilitate the easier access of local seed to world-class laboratories for faster genetic progress. Also, most firms pointed to the need for the government to revise and update its policies regarding Genetically Modified Organisms (GMOs) in order to enable local research firms to adopt GMO technologies and hence, operate at the same level as their foreign counterparts. Other initiatives that the government could consider to encourage R&D by private firms include tax incentives on research expenditure, the easing of bureaucratic hurdles pertaining to the registration of new products, and the tightening of measures to shield local researchers/breeders against generic competitors. Some of these suggestions have been tabulated below.

Table 10: List of policy suggestions by the private sector

Number	Policy suggestions
1	Tax incentives on research expenditure
2	Lifting phyto-sanitary restrictions for shipment of maize seed
3	Improve efficiency of current systems, maintaining regional departmental infrastructure, assistance in quality standards
4	Research grants to private institutions as public research institutions become obsolete
5	Improved investment confidence in South Africa - low crime, low tax, low bureaucratic hurdles
6	Encourage private-public partnerships as well as partnerships with universities
7	Increase fines drastically for farmers that do not obey the Plant Breeders Rights Act.
8	Implementation of the Forest Act and Forest Sector Charter
9	Encourage adoption of the latest GMO technology in South Africa
10	Better protection against generic competitors
11	Duty-free imports for research purposes

Source: Own compilation from survey

Conclusions

This study sought to investigate the nature and scope of agriculture R&D by the private sector in South Africa. Of the 51 institutions that were identified and contacted, 35 firms participated in the survey and only 19 firms returned complete questionnaires. Nonetheless, it was evident that most private agriculture firms in South Africa have formed partnerships with foreign multinational companies and operate as subsidiaries of these overseas companies. Therefore, in most cases, local firms import technology developed by these foreign companies as opposed to being innovators of their own local technology. Consequently, the bulk of local research is focused on testing this new imported technology in laboratories and on-farm to ensure registration and certification for use on the local market. This emerged as a major constraint in the data gathering process in that most firms operate under international agreements and could not make available the requested data. Nonetheless, some of the general trends observed from firms that participated in the survey are highlighted below.

Trends and levels of innovation & research

Aggregate total research expenditure from five subsectors increased consistently from R164 million in 2001 to R329 million in 2008, yielding a twofold increase over the seven-year period. Similarly, the number of research staff (in terms of head count) also increased by more than 25% from 158 in 2001 to 201 in 2007. Another addition to privately funded research was the extent to which farmers and commodity organizations in the agricultural industry in South Africa funds agricultural research. The National Agriculture Marketing Council report shows that R60.4 million was spent on research by these organizations during 2006.

The majority of the 'innovations' is either imported or adapted and distributed under license from international firms or parent companies. As has been highlighted above, most of the agricultural research done by the private sector is largely adaptive or done for testing purposes and to comply with the regulatory authorities.

Most important government policies

The most influencing policy initiatives in the participation of the private sector in South Africa's agriculture R&D have been the deregulation of the agriculture input and product markets and the liberalization of agricultural trade, which has increased the spill-in of agriculture technologies to South Africa. A couple of impediments still calling government attention include the need for the government to ease the stringent phyto-sanitary restrictions and revise and update its policies regarding GMOs in order to enable local research firms to adopt GMO technologies.

Lessons about collecting data & suggestions for future surveys

Due to the confidentiality of the data requested (financial records) and the fact that most firms operate as subsidiaries of parent foreign companies, it was increasingly difficult to access data from most firms. Also, because a time series data set for the past 8-10 years was required, consistency for all the firms was difficult. It was observed that there was missing data for some years in some firms and that the start point and end point was not the same for all firms.

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Annex A

Table 1: List of firms surveyed and who responded. If they responded was it to a mail questionnaire or if interview, who did interviews, how complete was the response

Organization	Address	Tel/Fax	Comments
1. Seed and fertilizer (10 companies)			
Pannar Seed	P.O. Box 19 Greytown 3250	T: (+2733) 413 9500 F: (+2733) 413 1097 Web: www.pannarseed.co.za	Completed
Pioneer	P.O. Box 8010 Centurion 0046	T: (+2712) 683 5700 F: (+2712) 663 4190 Web: www.pioneer.com	Pending
Agricol	PO Box 300 Brackenfell 7560	T: (+2712) 981 1126 F: (+2712) 981 1120 Web: www.agricol.co.za	Completed
Monsanto	PO Box 69933 Bryanston 2021	T: (+2711) 790 8200 F: (+2711) 790 8350 Web: www.monsanto.co.za	Completed
Klein Karoo Seed Marketing (Pty) Ltd	PO Box 159 Oudtshoorn 6620	T: (+2744) 203 5180 F: (+2744) 272 3719 Web: www.seedmarketing.co.za	Pending
Omnia	P O Box 69888 Bryanston 2021	T: (+2711) 709 8888 F: (+2711) 709 4022 Web: www.omnia.co.za	Completed
Hygrotech	P.O. Box 17220 Pretoria North Gerard Braak Street Pyramid 0120	T: (+2712) 545 8000 F: (+2712) 545 8088 Web: www.hygrotech.com	Completed
Sensako	Suite 261 Private Bag X153 Bryanston 2021	T: (+2758) 303 4690 F: (+2758) 306 7038 Web: www.sensako.co.za	Completed
Sakata Seed Southern	P.O. Box 160	T: (+2711) 548 2800	Completed

Africa (Pty) Ltd	Lanseria 1748	F: (+2758) 548 2820 Web : www.sakata.co.za	
Starke Ayres	P.O. 13339 Northmead 1511	T: (+2711) 748 3550 F: (+2711) 748 3591 Web : www.starkeyayres.co.za	Completed
2. Pesticides (9 companies)			
Total South Africa	P.O. Box 579 Saxonwold 2132	T: (+2711) 396 2913 F: (+2782) 3704090 Web: www.total.co.za	Completed
Sipcam South Africa	P.O. Box 516 Suiderspaarl 7624	T: (+2721) 874 1055 F: (+2721) 874 1214	No R&D in SA
Bayer Cropscience	P.O Box 143 Isando 1600	T: (+2711) 921 5911 F: (+2711) 921 5671 Web: www.bayercropscience.co.za	Completed
BASF South Africa	P.O. Box 2801 Halfway House 1685	T: (+2711) 203 2400 F: (+2711) 203 2431 Web: www.basf-cc.co.za	No R&D in SA
Chemtura Corporation	P.O Box 2089 Kempton Park 1620	T: (+2711) 397 4336 F: (+2711) 397 4316 Web: www.chemtura.com	No R&D in SA
Dow Agrosciences	P.O Box 76129 Lynwood ridge 0040	T: (+2712) 361 8112 F: (+2712) 361 8126	No R&D in SA
Du Pont De Nemours International	N/A	T: (+2712) 663 0844 F: (+2712) 663 0845	No R&D in SA
Philagro	P.O. Box 36213 Menlo Park 0102	T: (+2712) 348 8808 F: (+2712) 348 3500 Web: www.philagro.co.za	Completed
Syngenta	Private Bag X60 Halfway House 1685	T: (+2711) 541 4000 F: (+2711) 541 4022 Web: www.syngenta.co.za	Completed
SASOL	1 Sturdee Avenue	T: (+2711) 441 3111	Pending

	Rosebank 2196 South Africa	F: 0800 11 9449 Web: sasol.internet@sasol.com	
3. Feed and livestock (6 companies)			
Epol feeds	Head Office P.O. Box 101 Pinegowrie 2123	T: (011) 438 7500 F: (011) 438 7600 Web: www.epol.co.za	Pending
AFGRI Animal Feeds	Head Office Private Bag X2001 Isando 1600	T : (011) 306 4300 F : (011) 306 4301 Web: www.afgri-ir.co.za	Completed
Rainbow Chicken	Head Office PO Box 2734 Westway Office Park Westville, Kwazulu Natal 3635	Cell: 083 242 8500	Completed
NOVA Feeds (Pty) Ltd	P.O. Box 700 Malmesbury 7299	T: (022) 487 9100 F: (022) 482 3752 Web: www.novafeeds.co.za	Pending
Nutri Feeds (National Office)	Head Office P.O. Box 6686 Baillie Park 2526	T: (018) 293 0019 F: (018) 293 0131 Web: www.nutrifeeds.co.za	Pending
RPO	P.O Box 36802 Menlo Park 0102	T: (+2712) 348 1933 F: (+2712) 361 4430 Web: www.rpo.co.za	No participation
4. Agricultural Mechanization (2 companies)			
AFGRI	P.O. Box 11054 Centurion 0046	T: (+2712) 643 8000 F: (+2712) 663 8024 Web: www.afgri-ir.co.za	No R&D in SA
Uniekum	P.O. Box 82 Brackenfell 7560	T: (+2721) 981 3516 F: (+2721) 981 0800	No R&D in SA

5. Food and beverage (5 companies)		Web: www.uniekum.co.za	
Premier foods	Private Bag X2127 Isando 1600	T: (+2711) 565 4300 F: (+2711) 392 4997	Pending
		Web: www.premierfoods.com	
Tiger milling company	P.O. Box 78056 Sandton 2146	T: (+2711) 840 4000 F: (+2711) 514 0084	No R&D
		Web: www.tigerbrands.co.za	
Foodcorp	Private Bag X 209 Bryanston 2021	T: (+2711) 549 1030 F: (+2711) 549 1057	Pending
		Web: www.foodcorp.co.za	
South African Breweries	P.O. Box 782178 Sandton 2146	T: (+2711) 881 8111	Pending
		Web: www.sablimited.co.za	
Pioneer foods	P.O. Box 20 Huguenot 7645	T: (+2721) 807 5100 F: (+2721) 807 5280	Pending
		Web: www.pioneerfoods.co.za	
6. Agricultural Research Institutes (4 companies)			
Sugar Milling Research Institute	SMRI Hollard Campus Umbilo Durban 4041	T: (+2731) 273 1300 F: (+2731) 273 1302	Only coordinate R&D
		Web: www.smri.org	
South African Sugar Research Institute	P.O.Box 700 Mount Edgecome 4300	T: (+2731) 508 7400 F: (+2786) 643 2158	Pending
		Web: www.sasa.org.za	
Institute for Commercial Forestry Research	P.O. Box 100281 Scotsville 3209	T: (+2733) 386 2314 F: (+2733) 386 8905	Completed
		Web: www.icfr.ukzn.ac.za	
South African Society of Crop Production	Private Bag X29 Bethlehem 9700	T: (+2758) 307 3411 F: (+2758) 307 3519	Pending
		Web: www.sascp.co.za	
Citrus Research International	P O Box 28, Nelspruit,	T : +27 13 759 8000 Web: www.citrusres.com	Completed

1200

7. Wine and spirits (2 companies)

Distell	P.O. Box 907 Stellenbosch 7599	T: (+2721) 809 7801 F: (+2786) 680 5636 Web:www.distell.co.za	Pending
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KWV	P.O Box 528 Paarl 7624	T: (+2721) 844 9400 F: (+2721) 807 3000 Web: www.kwv.co.za	No R&D
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8. Agricultural Cooperatives (7 companies)

GWK	P.O. Box 47 Douglas 8730	T: (+2753) 298 8200 F: (+2753) 298 2445 Web: www.gwk.co.za	No R&D
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NWK	P.O. Box 107 Lichtenburg 2740	T: (+2718) 633 1000 F: (+2718) 633 1900 Web: www.nwk.co.za	Completed
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MGK	P.O. Box 2963 Brits 0250	T: (+2712) 381 2800 F: (+2712) 252 1669 Web: www.mgk.co.za	No R&D
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SENWES	P.O. Box 31 Klerksdorp 2570	T: (+2718) 464 7800 Web: www.senwes.co.za	No R&D
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SSK	P.O. Box 12 Swellendam 6740	T: (+2728) 514 8611 F: (+2728) 514 8656 Web: www.ssk.co.za	No R&D
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NTK	P.O. Box 29 Nylstroom 0510	T: (+2714) 719 9211 F: (+2714) 717 1118 Web: www.ntk.co.za	No R&D
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Suidwes	P.O. Box 5 Leeudoringstad 2640	T: (+2718) 581 1000 Web : www.suidwes.co.za	No R&D
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9. Forestry and Fishing (5 companies)

SAPPI	P.O. Box 32706	T: (+2711) 407 8111	Pending
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	Braamfontein 2017	F: (+2711) 339 8022	
		Web: www.sappi.com	
Mondi Packaging South Africa	PostNet Suite #444 Private Bag X1 Melrose Arch 2076	T: (+2711) 994 5400 F: (+2711) 994 5506)	Pending
South African Forestry Company Limited	P.O. Box 1771 Silverton 0127	T: (+2712) 481 3500 F: (+2712) 804 3716	Pending
		Web: www.komatielandforests.co.za	
Oceanographic Research Institute	P.O. Box 10712 Marine Parade Durban 4056	T: (+2731) 328 8222 F: (+2731) 328 8188	Completed
		Web: www.ori.org.za	
Sea Fisheries Research Institute	Private Bag X2 Roggebaai 8012	T: (+2721) 402 3911	Pending

By Johann Kirsten, Ruan Stander, Choolwe Haankuku, Department of Agricultural Economics, Extension and Rural Development, University of Pretoria, Pretoria 0002, South Africa, Office: Room 2.22, Agricultural Annex Phone: (+27-12) 420 3251 Fax: (+27-12) 420 3247, E-Mail: johann.kirsten@up.ac.za. This South Africa case study is part of a study of private agricultural innovation and R&D in 8 countries funded by the Bill and Melinda Gates Foundation during 2008-10, and managed by: Rutgers University, US; McGill University, Canada; and the International Food Policy Research Institute (IFPRI). Other countries in the study are Kenya, Zambia, Senegal, and Tanzania in Africa, and Bangladesh, India, and Pakistan in Asia. Carl Pray, (pray@aesop.rutgers.edu), David Spielman (d.spielman@CGIAR.org), and Anwar Naseem (anwar.naseem@mcgill.ca) co-direct the study. This study has not been peer reviewed. Any opinions herein are those of the author(s) and do not necessarily reflect the policies or opinions of IFPRI, its partners, or collaborators.

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