The role of the Agricultural Research Council in delivering high performance varieties to subsistence or smallholder farmers

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A presentation to a UPOV Workshop
Geneva, Switzerland
2 November 2012

The ARC mandate

To conduct research, development and technology transfer in order to:

• Contribute to better quality of life;
• Facilitate/ensure natural resource conservation;
• Promote agricultural development & development of the agricultural sector
The ARC’s R&D mandate and scope

- **GRAIN CROPS**
  - Maize, sorghum, barley, sunflower, soya bean, dry beans, wheat, oats, groundnuts, cowpea, bambara nuts, tobacco, new crops
- **HORTICULTURE**
  - Vegetables (leafy, root & tuber vegetables), tropical & subtropical crops, deciduous fruits, citrus, viticulture, temperate crops
- **NATURAL RESOURCES and ENVIRONMENT**
  - Soils, climate, water, biocontrol agents, weed control

- **LIVESTOCK** (production & diseases)
  - Cattle, sheep, goats, poultry, pigs
  - Vaccines development, artificial insemination technology
  - Diagnostics (ELISA and lateral flow) and surveillance
  - Ryegrasses
- **AGRICULTURAL ENGINEERING**
  - Customised agricultural implements design and manufacturing
  - Agro-processing technology
  - Irrigation control and optimization
  - Rainwater harvesting
ARC intellectual asset classes

• Composition
• **Plant Breeder’s Rights** – predominant
• Patents
• Copyrights (publications)
• Trademarks
• Trade secrets
• Know-how

South Africa and UPOV

• Member country to UPOV 1978
• Act amended in 1996
  – conformity to Constitution
  – Alignment and compliance to UPOV 1991
  – Country has not acceded to UPOV 1991
• Plant Improvement Act, 1976 (Act 53 of 1976)
• Ministry responsible for Agriculture, now includes Forestry and Fisheries
Breeder’s Rights Applicability

• PROCESS:
  – Resident of South Africa or any other UPOV country
  – Agency mandate for non-residents, mainly administrative and legal compliance
  – Specified administrative process
  – Includes variety listing
  – Submit quantity of propagating material for examination

• EVALUATION:
  – National authority maintains reference collections (some at ARC)
  – Fruit and some ornamentals: breeder or the agent establishes trials on own site
  – National authority conducts planting trials for examination over three growing cycles
  – Examination focus: Distinct, Uniform, Stable

Granted Plant Breeders’ Rights

• Enables commercialization & technology transfer
• Conducted through Plant Improvement Act (variety listing)
• Period of Breeder’s right:
  – 25 years for trees and vines
  – 20 years for all other crops
  – Initial 5 years – sole right to the PBR holder
  – Remaining 15 years – PBR holder must issue licence to anyone requesting, within the prescribed legislation
  – National authority may expropriate rights for national interest – food security needs
  – National authority may issue a compulsory licence
  – Automatic expiry of rights following prescribed period
  – Farm-retained seed permitted
IPR from publicly-financed R&D Act (IPR Act)

- Purpose: Publicly funded R&D must be protected and exploited (through commercialization) to benefit the people of South Africa
  - A portion of state funds must return to the state
  - Recipients of public funding for R&D must
    - act in a manner conducive to public good
    - acknowledge & reward innovation
    - enable economic growth through enterprise development
  - Promote the publishing of scientific results

ARC’s interpretation & response to the IPR Act

- Technology Transfer Office established
  - Executive for Technology Transfer
  - Intellectual Property Manager
  - Commercialization Manager
  - Corporate Legal Advisor
- ARC Intellectual Property Rights Policy developed
- Policy development to facilitate technology transfer
  - Licencing policy
  - Commercialization policy
    - Incubation and SMME development framework
  - Income generation policy
  - Policy for the management of joint ventures
  - Investment into R&D
ARC PBR record

• An analysis of the current (2011) PBR register
  – 2424 PBR’s registered
  – 332 belong to the ARC
    • 14% contribution by the ARC alone.
• Approximately 20 new registrations
• Officially updated in the 2012 edition

Parliamentary grant funding
ARC licensing income as a percentage of R&D spend

- The ARC’s licensing income as a percentage of R&D spend is comparable to, and also surpasses that of other country and regional averages in a number of benchmarks
- The ARC ranked 3rd out of the 8 case studies that were examined by Deloitte South Africa
- The ARC outperformed its local peers

Smallholder farmer definition in South Africa

- 300,000 - 400,000 farmers
- Collectively on 14 million ha of agricultural land
- Marginalized into regions of poor productive land, with little or no infrastructural support, and water resources
• Generally have low levels of production efficiency
• Production
  – linked primarily to poor farm management skills
    • e.g. natural resource management, production and infrastructural management, financial services, technical support;
• Existing value chains
  – lock smallholder farmers out of markets;

• Training and information dissemination
  – ARC-developed
  – Accredited through the AgriSETA (Agricultural Sector Education Training Authority),
  – The actual training is delivered by ARC scientists, and trained extension officers.
ARC response

- **Enterprise and incubator development**
  - ensuring the transfer of ARC-developed technologies, either to individuals organized within entities
    - to SMMEs, established to eventually be self-sustainable and commercially viable;
  - diversifying the agricultural sector, through increasing the number of options available to emerging farmers and their agribusinesses,
  - play significant roles in the agriculture value chain.
Orange-fleshed sweet potatoes

The ARC’s Bophelo cultivar:
- Result of ARC breeding programme
- Protected
- Addresses Vitamin A deficiency
- Introduced to rural farming communities.

- Tshiombo Community
- 100 small holder farmers
- 1.5 ha each
- Approached the ARC for assistance with production
  - Extended to an opportunity for production and marketing of produce into retail stores.
• The funding for this initiative was provided by the South African Department of Science and Technology.
• Partner University
  – University of Limpopo
  – Nursery for virus-indexed cuttings

• The NAMC (National Agricultural Marketing Council)
  – support to emerging farmers in
    • market access, knowledge acquisition, training, and mentorship.
• Identified the barriers of entry into the market.
  – the establishment of a formal entity with which supply contracts could be negotiated with retail stores
  – the standard, consistency, reliability of supply and quality of produce demanded by the retail stores, and
  – the establishment of a packing facility.

• The PPECB (Perishable Products Export Control Board)
  – product quality and grading training
  – food safety, good agricultural practice
  – responsible use of pesticides
  – Pre-audits against certain certification standards.

• Currently sell to local market
  – demand for superior product has been created
Packhouse
• **Impact**
  – access to the ARC’s high-value cultivars
  – net profit of R130, 000 per harvest per smallholder farmer
  – informal market only.
  – the potential for sales is greater as the ARC concludes supply contracts with retail stores and significant players such as Walmart.
Floriculture

- Nieuwoudtville, N. Cape province
- Lachenalia, Ornithogalum and Eucomis
- Northern Cape Dept of Agriculture and ARC partnership
  - Technology and funding
- Export 300,000-500,000 bulbs per annum to the Netherlands
  - Dutch flower market
- Low local sales
• Need other product offerings
  – Seasonal
  – In-licensing opportunities sought
• Value chain not optimized to benefit the community
  – IP management company to manage the technology development, bulking-up, commercialization and export using commercial principles (high-throughput, differential pricing for different markets, packaging)
• Access to EU markets sought

• New Citrus cultivar called Sonet
• A result of an ARC breeding programme
• Licensed for commercialization in SA and SADEC region, as well as internationally
• Will be sought after in global markets
• Others: Valley Gold, African Sunset
• Local licensing agreement with a South African company
  – for the commercialization of some of the ARC’s citrus varieties.
  – A condition of the license: ensure the participation of smallholder citrus producers in the commercialization value-chain.

• Facilitated partnership with the Citrus Growers’ Association to access ARC

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Deciduous fruit

• A new blushed pear selection, Cheeky™
• Result of ARC breeding programme.
• Keeps its delicate blush during warm periods
• Good storage ability of up to 12 weeks
• Pleasant taste after storage
• Comes on the market when there are no other blush pears.
• Blush pears fetch premium prices.
• **Impact**
  – using a single ARC cultivar, the Cheeky® Pear variety, the income accruable to licensees of this cultivar, from a potential of 1000 ha is estimated at R138million per annum, with a the potential to create 1260 farm worker jobs.

• The ARC-Small Grain Institute
• Training and Advisory
  – the verification of wheat cultivars suitable for production in resource limited agricultural areas via on-farm trials
  – the characterization of cultivars
    • yield potential and yield stability in selected resource- limited areas under dryland and irrigated conditions
– the comparison of agronomic characteristics and quality parameters of these cultivars in different environments
– reliable recommendations that are based on applicable scientific research
– relevant technology to smallholder farmers
  • production guidelines
  • farmers’ days marketing events
  • technology demonstrations.

• Impact
– based on royalties received, and an average of 9.5% royalty rate for a few of the ARC’s wheat cultivars, the estimated revenue accrued to wheat farmers who have licenses the ARC’s cultivars was R36.7million in 2011/12.
Other examples

• **Groundnut varieties for dryland and irrigation areas**
  – Registered new variety
    • Dryland areas
    • Others for irrigation areas
• **Feasibility study for the establishment of rice-production in South Africa**
  – Can be done!
  – Global partnerships sought

Summary

• As a public entity ARC utilizes PVP to enhance benefit sharing:
  – Effective technology transfer - mainly for agriculture development and growth
  – Enable competitiveness of the agriculture sector
  – Contribute cultivars that are important for food security
  – Incentivise innovation through:
    • Further investments into R&D
    • Providing a share of the revenue generated to inventor
    • Stimulate enterprise development
    • Facilitate access to poor farmers for development
Acknowledgements

• ARC
• ARC contributors to this paper
• UPOV

Thank you

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