A 50 years perspective on research trends and future opportunities

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SUMMARY

In the fifty years of the South African Avocado Growers' Association research forum existence, more than 800 scientific articles were published. During the first decade both *Phytophthora*, *Pseudocercospora* and *Colletotrichum* were successful controlled. Improved tree health paved the way for intensive orchard management. At the same time, due the extensive plantings, insect pests had to be addressed. Recently research evolved to cost savings, phytosanitary issues, residues and alternative fungicides or insecticides.

The paper concludes with new technological invention, which may be applicable to the avocado industry and some risks, which will encounter.

INTRODUCTION

From the humble birth in the late 1960s the South African Avocado Growers' Association (SAAGA) grew from strength to strength through the visions and huge efforts by many men and women to where it is today. The history of SAAGA was sketched (Bezuidenhout, 1977), thus this paper will concentrate on the research trends the past 50 years and conclude with opportunities and risks, which the industry may encounter.

The main aim with the establishment of SAAGA was marketing, both local and overseas. However, with the increased avocado volumes from the 1930s, more and more technical challenges were encountered. Soon it became apparent a forum was required to solve technical issues. Therefore, coordinated research in the avocado industry was initiated in 1976 under the able leadership of Prof JM Kotzé (Pretoria University) until he retired in 1994.

RESEARCH TRENDS

Two main periods in the research output exist, pre 1997 and post 1997 (Fig. 1 & Table 1). Pre 1997 researchers focussed on disease control, orchard management and biochemical/physiological aspects. After 1997, entomological studies gained prominence. From 1977 to date, more than 800 publications featured in the SAAGA yearbooks. The steep decline in the number of research papers was due to funds channelled away from the research budget to promotions (Donkin, pers. comm., 2017). Eventually, avocado growers halted this decision in 2014, since then the number of articles increased gradually.

Initially avocado orchards, which replaced citrus due to the greening disease, thrived until the late 1960s when the trees became infected with root rot. At the same time fruit diseases became a major waste factor. The industry faced being wiped out by either *Phytophthora* or *Pseudocercospora* or both. Teams at Westfalia, the University of Pretoria's Pathology Department (UP) and elsewhere achieved marvellous success in combating both diseases from 1977 to 1982.

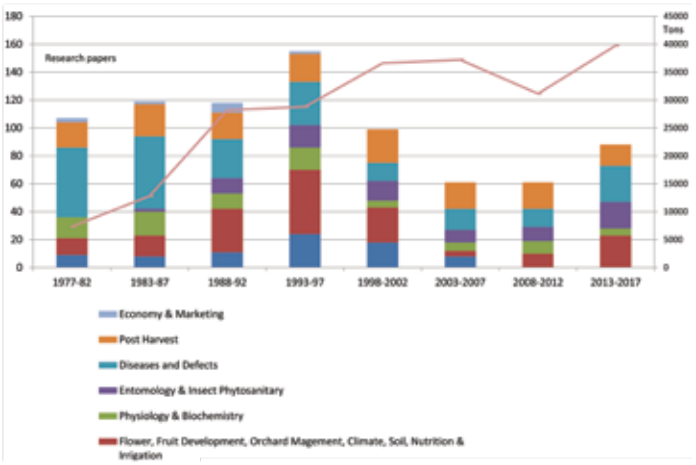


Figure 1. The number of papers on a topic and line indicates the average tonnes avocado exports during that period. For 1987, only papers based on South African research was included.

Table 1. The percentage papers on a topic for a five-year period and the total number of publications in that period. For 1987 (Avocado World Congress) only papers based on South African research was included.

Year	1977-1982	1983-1987	1988-1992	1993-1997	1998-2002	2003-2007	2008-2012	2013-2017
Breeding, Selection, Tissue culture & Nursery practices	8	7	9	15	18	13	0	0
Flower, Fruit development, Orchard management, Climate, Soil, Nutrition & Irrigation	11	13	26	30	25	7	16	26
Physiology & Biochemistry	14	14	9	10	5	10	15	6
Entomology & Insect phytosanitary	0	2	9	10	14	15	16	22
Diseases and defects	47	44	24	20	13	25	21	30
Postharvest	17	19	16	13	24	31	31	17
Economy & Marketing	3	2	6	1	0	0	0	0
Number of publications	107	119	118	155	99	61	61	88

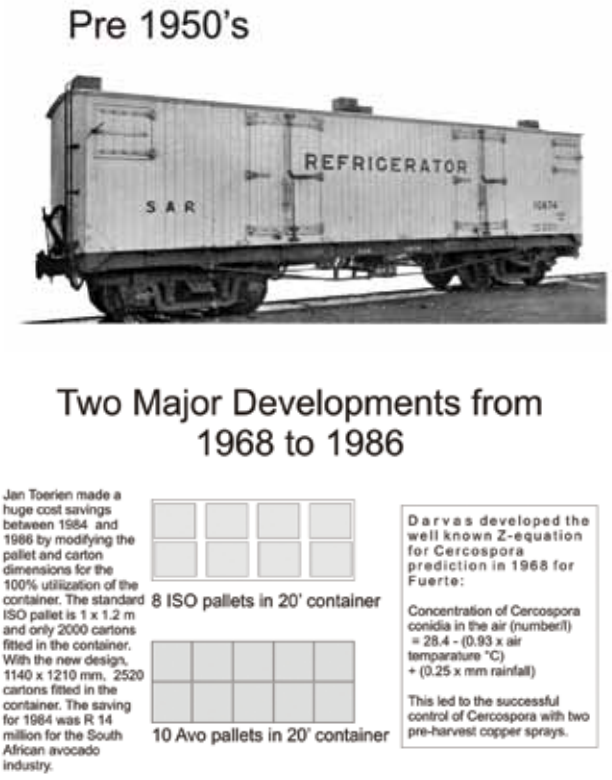


Table 2. The GINI coefficient for a few selected countries, GINI index (World Bank estimate).

Country	GINI coefficient
Mozambique	0.45
Pakistan	0.30
Rwanda	0.50
South Africa	0.63 (2008)
Thailand	0.38
United Kingdom	0.32
Zimbabwe	0.66

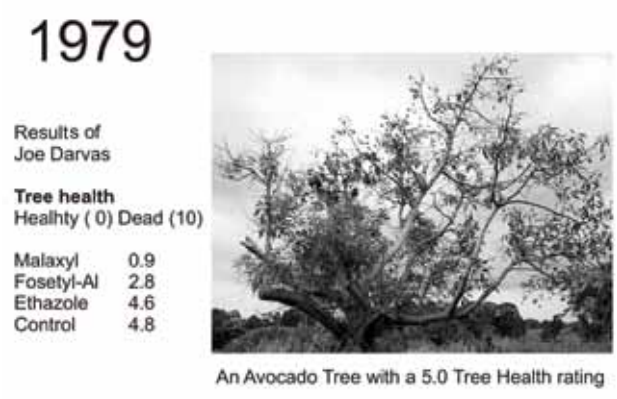
In the five-year period from 1977 more success was attained in addressing challenges in the avocado industry than any other period. On average during that period, one article was published for every 342 tonnes avocado exported. The corresponding figure for 2013-2017 was 1 publication/2 258 tonnes exported.

Titles of papers published from 1977 to 1982 in the SAAGA yearbook:

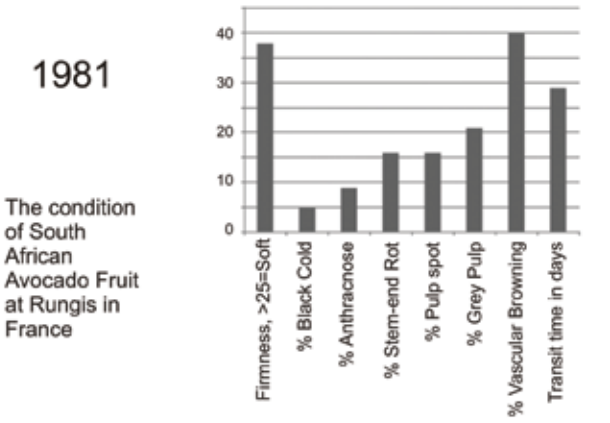
1977: Cercospora spot; The effect of the absence of Pedicels on Post-Harvest Diseases of Avocados; Fungi associated with Post-Harvest diseases of Avocados; Control of Post-Harvest diseases on Avocado fruit by Fungicides with special emphasis on Tecto and Benlate; Invloed van Tag en DM2HB op die gehalte van Avokados in koelopberging in kombinasie met sellofaan; Soil effects on Phytophthora root rot of Avocados; Production of Avocado trees in the nursery; Treatment of irrigation water for Avocado nurseries; A morphological and physiological study of the rooting possibility of three cultivar cuttings; Oliebepalings as aanduiding van die rypheid van Avokados; Incoming solar radiation and internal water status as stress in Avocado, *Persea americana*; Ondersoek om produksie in Avokado boorde wat verdig het te verhoog deur snoei en uitdunning; Avocado soils on Mataffin.

1978: Common root pathogens from avocados; Preliminary results on chemical control of *Phytophthora* root rot in avocados; Chemical control of Phytophthora root rot on fully grown avocado trees; *Phytophthora* root rot; Beworteling van avokado (*Persea americana* Mill.) steggies; Avokado-bemesting – Jongste navorsingsresultate; Effect of external cull factors on internal quality; Analysis of internal and external culling factors on exported avocados; Effect of injury on storage of avocados; Die effek van die stingel op avokado vrugkwaliteit gedurende koel-opberging; Ultrastrukturele veranderings by die

verbruining of verkleuring van avokadovrugte; Physiological and biochemical factors associated with the Fuerte avocado fruit development; Cercospora spot; Anthracnose of avocados; Stem-end rot and other post-harvest diseases; Control of post-harvest diseases on avocados; Na-oes probleme by avokado's soos beïnvloed deur die seisoen; Avocado Sunblotch research in South Africa (1978); Some aspects of the oil and moisture contents of avocado fruit; The effect of shade and water relations in the avocado cv. Edranol; Vrugtevlieg en Valskodlingmot by avokado produksie.



1979: Report on *Phytophthora* root rot of avocado in South Africa; Die avokadobedryf in Suid-Afrika – 'n Evaluasie en toekomsblik; Phases of seasonal growth of the Avocado tree; Prospects for integrated and biological control of avocado root rot – some overseas impressions; Control of *Phytophthora* root rot on young replanted avocado trees; Chemical control of Phytophthora root rot on fully grown avocado trees; Water relations of *Phytophthora* infected Fuerte avocado trees and their influence on management; Lupine bait technique for the semi-quantitative analysis of *Phytophthora cinnamomi* and other root pathogens in avocado soils; Ecology of avocado root pathogens; Verslag oor avokadobemestingsnavorsing; Avocado soil moisture studies; Cercospora spot of avocados; Stem-end rot and other post-harvest diseases; Control of Anthracnose of avocados: Techniques to evaluate fungicides (Progress Report); Sooty blotch of avocados; Seasonal incidence of ring-neck on avocados and possible causes; The identification of causes of typical surface lesions on avocado fruit; An investigation into the causes of Carapace spot (Progress Report); Vrugtemperatuurstudie tydens pluk en verpakking; Thinning of an avocado orchard (Progress Report); Successful grafting of avocados after the commencement of flower bud differentiation (Progress Report); Effect of ringbarking and IBA on rooting of etiolated Duke seedlings (Progress Report); Treatment of avocado graftwood with anti transpirant prior to grafting (Progress Report); Avocado sunblotch research report; Ultrastrukturele veranderings by Pulpvlek van avokadovrugte (Vorderingsverslag); 'n Metode vir die bepaling van rypheid by avokado's; Seasonal changes in the composition of avocado oil recovered by centrifugation.



1981 (No papers were published in 1980): Marketing: SAAGA European Committee's report; Co-ordination of research sponsored by SAAGA; Avocado oil, the Cinderella of the avocado industry?; Plant propagation through tissue culture; Root, Shoot or fruit?; Interpretation of avocado quality and condition in the marketing context; Artificial ripening of avocado fruit; A model for fruit ripeness; Fermometer-ondersoeke by avokado's; Cooling rates of avocados in cartons when palletized; The annual incidence of avocado cull factors in the Letaba district; A comparison between waxing and cellophane wrapping of avocados for export; Post-harvest diseases of avocados; Control of Cercospora spot; Pre-harvest chemical control of Anthracnose and Sooty Blotch; Pre-harvest chemical control of post-harvest avocado diseases; Anatomiese aspekte van Ringnek van avokado's; *Akropeltopsis*: The cause of Sooty Blotch of avocados; Host range studies on avocado Sunblotch; Rapid testing for avocado Sunblotch; The role of fruit flies on avocados early in the season; Flower and fruit drop; Fungitoxic chemical substances in avocados; Bekalking van suurgrond; A comparison of various calcium sources on soil effects; Effek van kalsium op wortelvrot; Results obtained in 1980 from avocado root rot field trials; Some aspects of *Phytophthora cinnamomi* Rands infection of grapevines; Avocado (*Persea americana*) (Mill.) Stock-scion interactions as evidenced by peroxidase activity and stem growth; Die invloed van mediumdeurlugting, swamdoder en Indoolbottersuur op die beworteling van avokadosteggies; Sterilization & pasteurization of soil mixes.

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1982: Die avokado-ondersoek by Rungis, Frankryk gedurende 1981; Quality and oil content of early season Fuerte avocado originating from the Levubu region; Avocado fruit quality studies in the Nelspruit area from 1977 – 1981; Intracellular localization of Polyphenoloxidase in avocado fruit; Sensitivity of fungal pathogens to chemical substances in avocado trees; The influence of Fuerte fruit water potential on ripening; Avokado-oliebepalings; Beheerde en gemodifiseerde atmosfeer opberging van avokados; 'n Nuwe benadering tot die verkoeling van uitvoer avocados; Tydsduur en temperatuurskommelings vanaf pakhuis tot op die oorsese mark; Pre-harvest chemical control of anthracnose, sooty blotch and Cercospora spot of avocados; Pre-harvest chemical control of the post-harvest diseases of Fuerte avocados; Chemical control of Cercospora spot disease of avocados; Die intensiteit van uitskotfaktore wat verantwoordelik is dat avokadovrugte onbemarkbaar word; Wakse; Tissue culture of avocado; Attempts at propagation of avocados using various techniques; Avocado fruit growth and maturity in two Natal localities; Aerial photography and root diseases; Die uitwerking van kalsium op wortelvrot by avocado; Die evaluasie van swammiddels teen avokadowortelvrot; Chemical control of *Phytophthora* root rot on young replanted avocado trees; Chemical control of *Phytophthora* root rot on fully grown avocado trees; Disease potential and recovery of *P.cinnamomi* in relation to the severity of avocado root rot; Control of *P. cinnamomi* causing root rot of avocados; Preliminary report on avocado sunblotch field indexing; Bacterial disease of avocado.

Above research was the foundation for most of the further investigations. The papers are characterised by:

- Hand-on approach – most of authors were intimately involved in the industry, either as an avocado grower or researcher at active and dynamic avocado intuitions.
- Clearly state the problem and give a practical solution.
- Concise nature of the article.

Incumbent avocado researchers are urged to study above papers in detail – some of them are written in Afrikaans – there is no excuse not to read those articles.

Noteworthy subsequent publications:

1983: Post-harvest disease control in avocados using Prochloraz; Bestraling van avokadovrugte met Kobalt 60 om rypwording te vertraag; Die effek van voedingswanbalanse in suurgrond op pulpvlek voorkoms by avokado; Kalsiumnitraat bespuitings op avokados te Westfalia-Landgoed met die doel om pulpvlek te verminder; Die invloed van medium, steggie-oriëntasie, -lengte en -groeisiklushout op etiolering; Efficacy of Systemic fungicides applied as a trunk paint and a sponge band for the control of root rot on five year old avocado trees; Five years of continued chemical control of *Phytophthora* root rot of avocados.

1984: The economics of avocado production in the Tzaneen area; Failure to control *Phytophthora cinnamomi* and *Pythium splendens* with metalaxyl after its prolonged use; Zinc supplemented to avocado trees in conjunction with root rot control injections.

Braai at Lisikili, Westfalia. From Left: Bar-Joseph, John Moll, Prof Kotzé, Jan Toerien, Marie du Toit, Lindsey Milne, Colin Partridge, Barry Manicom, Nino Burelli, Martin Slabbert

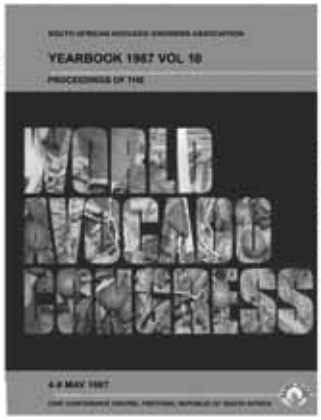
1985: Guidelines for an avocado improvement programme; Selection of avocado rootstocks; ULV application of systemic fungicides for the control of post-harvest avocado diseases; Pre-ripening of avocado fruit by post-harvest treatments with ethylene.

1986: Better yields from smaller trees; Commercial monitoring of avocado sunblotch viroid; A comparison of hand guns and mist blowers for the application of fungicides; The South African export market for avocados and the exchange rate: effects on profitability; Kokosneutstinkbesie – 'n potensïele plaag van avokado's; Recent experience with using synthetic DNA probes for the detection of avocado sunblotch viroid; 'n Literatuuroorsig van avokado-blommorfologie en avokado-palinologie, met enkele verwysings na 'n ondersoek van stuifmeel van die Fuerte cultivar; Avocado rootstock/scion relationships: A limited survey of the situation in South Africa.

1987: The first Avocado World Symposium held in South Africa.

Jan Toerien was the chairman of the organizing committee.

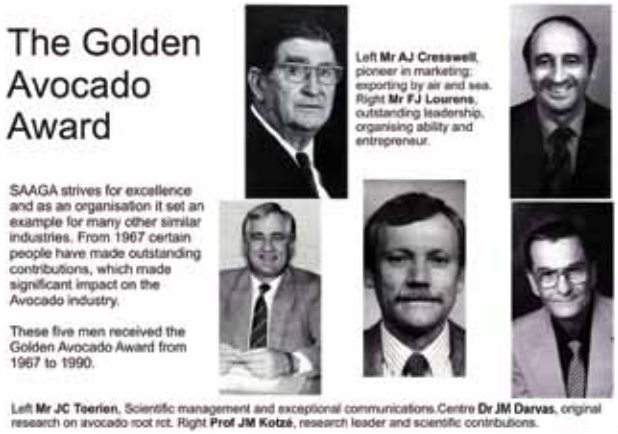
A few of the countries represented at the congress were Australia, Brazil, Chile, France, Guatemala, Honduras, Israel, Peru, Spain and the USA.



Sixty nine presentations were delivered on a very wide range of topics including history, physiology, biotechnology and marketing.

1988: Factors that influence the domestic demand for avocados in South Africa with special reference to urban black consumer preferences; Institutional aspects of a marketing strategy for avocados; A survey of urban black consumer preferences with regard to avocados in the Pretoria/Johannesburg area; Distribution of phosphite in avocado trees after trunk injection with phosphorous acid and its possible response to *Phytophthora cinnamomi*; The influence of the time temperature interaction on the shelf-life and internal quality of avocados.

1989: Comparison of growth regulators paclobutrazol and uniconazole on avocado.



1990: Results of a high-density avocado planting; Temperature management of avocados – an integrated approach; Effects of exchange rate variability on the production cost and profitability of avocados.

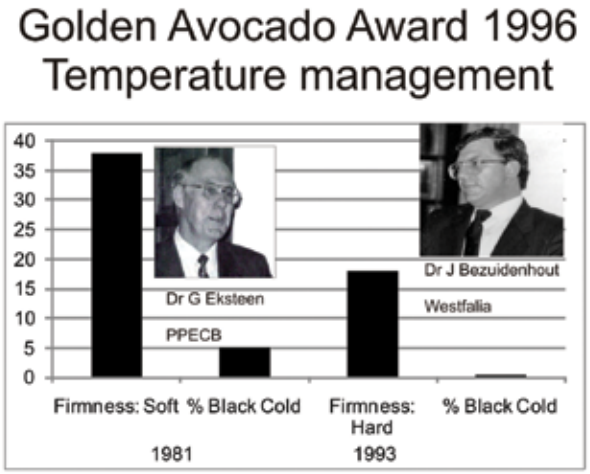
1991: Yield and fruit quality of avocado cv Fuerte as influenced by paclobutrazol foliar applications; Increasing Hass fruit size; Avocado high density planting – a progress report; The principles of temperature management – commercial results; Vooroeshantering van avokado's.

1992: The economy of avocado production in South Africa; Increased yield through girdling of young Hass trees prior to thinning; Yield and fruit quality of Fuerte and Hass on clonal rootstocks.

1993: Progress report on avocado tree size control by means of bark manipulation, dwarfing interstocks and rootstocks; Horticultural performance of imported cultivars and rootstocks in the north-eastern Transvaal; Effect of CPPU sprays on yield and fruit size in avocado cv Hass.

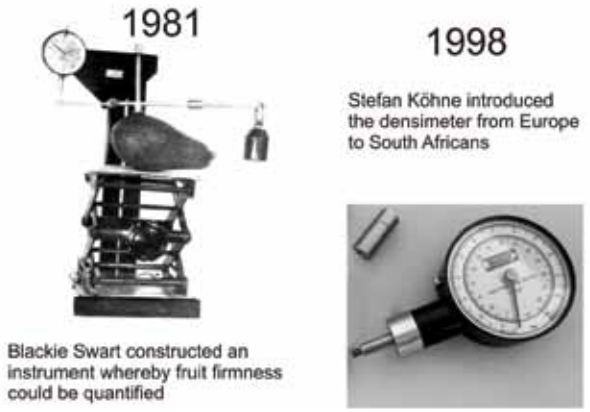
1994: Challenges to the Avocado Producer; Intensification of Avocado Trade in the European Community; Die Verband tussen Opbergingstemperatuur en -Tyd op die Gehalte van Avokado's Oorsee; Cold Storage Temperature Regimes and Tolerance of Avocado Fruit to Cold Storage; Principles of Steam Pasteurization; Steam Pasteurization as an alternative to Methyl Bromide Fumigation for Disinfecting Container Medium; Horticultural Performance of Fuerte Avocado on Duke 7 and G6 Rootstocks.

1995: Approaches to Solving the Hass Small Fruit Problem: Progress Report; Progress Report on Pruning Hass Avocado Trees to Hedgerows; Picking Hass Avocados without Pedicel.



1996: Fuerte Fruit Quality as Influenced by Postharvest Chlorine and Wax Treatments.

1997: Does Avocado Research Pay?; The Effect of Preshipment Factors on the Market Quality of Fuerte Avocados – 1996 Season; Alternatives to Polyethylene Wax as Post-Harvest Treatment for Avocados.



1998: Non-Destructive Avocado Fruit Firmness Measurement; Avocado Quality Assurance: Who? Where? When? How?.

From the early 2000s, with the avocado monoculture practice, insect pests gained prominence and between 10% and 22% of the publications focussed on entomology. Market access to the USA was investigated and -Methyl cyclopropene showed promise as an alternative to Controlled Atmosphere.

1999: Geïntegreerde beheer van suigbesies (Hemipterans) by avokado; The false codling moth, *Cryptophlebia leucotreta* (Meyrick) (Lepidoptera: Tortricidae) on avocado – a literature review.

2000: Ekonomiese drempelwaardes, 'n opnametegniek en beheertydsberekening in 'n geïntegreerde plaagbestuursprogram vir die beheer van suigbesies by avokado; Duur van onvolwasse lewenstadia, generasiepieke en migrasiepatrone van suigbesies (Hemipterans) by avokado; Host status of Hass avocado fruit for the false codling moth, *Cryptophlebia leucotreta* (Meyrick) (Lepidoptera: Tortricidae); Preliminary investigation into the use of controlled atmosphere (CA) to control false codling moth (FCM) in Hass avocados with a view to gaining market access to the USA.

2001: Aspects of the water economy of avocado trees (*Persea Americana*, cv. Hass); Geïntegreerde beheer van suigbesies (Hemiptera) in avokadoboorde.

2002: 1-Methyl cyclopropene (1-MCP): An alternative for controlled atmosphere storage of South African export avocados.

2003: Semi-commercial evaluation of SmartFresh with South African export avocados in static containers at the Westfalia packhouse during 2002.

The application of 1-Methyl cyclopropene (MCP) in shipping had huge financial implications. Prior to the use of MCP the increased cost of Controlled Atmosphere (CA) was significantly higher than inflation cost or exchange rate increases. The success of MCP had a direct and impromptu effect on decreasing CA cost.

2004: Nitrogen – the manipulator element: Managing inputs and outputs in different environments.

2005: Avocado root rots in Andalucia: A review; Production variability among Hass avocado trees grafted onto Mexican rootstocks; Evaluation of the Hass-like avocado cultivars Harvest, Gem and Grace at Westfalia Technological Services.

2006: Evaluation of the Hass-like avocado cultivars Harvest, Gem and Grace; "Sagte" insekdoders vir die beheer van suigbesies gedurende die middel tot laat somer – finale verslag.

2007: Evaluation of the Hass-like avocado cultivars Harvest, Gem and Grace.

2008: Control of the false codling moth with the Isomate mating disruption technology.

In 2009 and 2010 a successful protocol was developed for shipping 'Hass' to the USA. With increased labour cost, ULV fungicide application with mist blower came into existence while alternative application of phosphite came under investigation again. In striving for higher yield and better fruit, growing under shade netting are now intensively studied.

2009: Semi-commercial trials to determine the risk of shipping 'Hass' at 1°C for 30 days.

2010: Semi-commercial trials to determine the risk of shipping South African 'Hass' at 1°C.

2011: Evaluation of ultra-low volume fungicide applications for the control of diseases on avocado fruit – Results from the 2009/10 season.

2012: Evaluation of ultra-low volume fungicide applications for the control of diseases on avocado fruit – Results from the 2010/11 season; Development of a more effective post-harvest treatment for the control of post-harvest diseases of avocado fruit – Results from 2011.

2013: Development of a more effective postharvest treatment for the control of postharvest diseases of avocado fruit; Ultra-low volume fungicide applications for the control of diseases on avocado – A three year review.

2014: Oil content of the commercial avocado varieties and the relationship with moisture and ripening pattern; In vitro sensitivity of South African *Phytophthora cinnamomi* to phosphite at different phosphate concentrations.

2015: Growing avocados under shade netting. Progress report – Year 2; Investigating root phosphite quantification methods for optimising foliar spray application in avocado – Preliminary report.

2016: Evaluating foliar phosphonate sprays as an alternative to trunk injections for the controlling avocado root rot preventively – Preliminary report; Growing avocados under shade netting. Progress report – Year 3.

Although during these five decades avocado growers, researchers, technical officers, exporters and supporting personnel experienced successes, failures and disappointment, the author noticed a new and exciting dynamic at the recent avocado symposium. In the audience and on the podium young people featured prominently.

THE FUTURE

For the next generation – open minded and youthful, challenges are going to be galore. While technical developments and risks face South

Africans, opportunities exist with both technical developments and ways to address risks. To my generation – foster these young men and women, if you differ from them discuss it in private with them displaying your emotional intelligence.

PRESENT DEVELOPMENTS

Robots and drones

Where labour is expensive, robots replace humans. An excellent example is the mining industry. According to Fortune (Andrew Nusca Aug 25, 2015), miners focus on safety improvement, asset automation and robotics & aerial vehicles or drones. Other examples are Tesla and Google vehicles (IDTechEx report Sensors for Robotics: Technologies, Markets and Forecasts 2017-2027), Daimler and Volvo. The Rover travelled on the Moon surface for about 40 km. This technology can be used for non-human spray vehicles and tractors.

Drone technology will give the agriculture industry a high-technology makeover, with planning and strategy based on real-time data gathering and processing. PwC estimates the market for drone-powered solutions in US agriculture at $32.4 billion. The following are five ways aerial and ground-based drones will be used throughout the crop cycle (Michal Mazur, PwC's Drone-Powered Solutions division, 2016): Soil and field analysis; Crop spraying; Crop monitoring; Irrigation; Health assessment.

Internet

The impact of social media can either benefit (promotion, dissemination of information, advertising etc.) the user or cause complete disaster on the receiving side, illustrated by the recent Ford debacle. The exciting presentation by Andy Zynga showed how to accelerate the innovation cycle through open innovation (Zynga, 2017).

RISKS

Many blink on the horizon: policy uncertainty, politics, legal and financial insecurity, increased global production, competition, trade barriers, the spectrum of fungicides and pesticides shrink, new insect pests or the development of resistance by insects or fungi, carbon tax … climate change.

Water

Of particular concern is that agriculture is by far the biggest water user in South Africa. Data from 2000 showed irrigation use 63% of the country's available water (Water Accounts for South Africa, 2000). Households will demand more water at the expense of agriculture. A draft for water tax is on the drawing board.

Water pollution increased dramatically in the past 20 years with dire health consequences (Turton A, 2016). This in turn reduces useable water.

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Electricity

Unless the avocado industry is prepared to fund the R9 billion plus nuclear plant, alternatives to electricity provision should be prioritised. An excerpt from Bashe *et al*. (2016), summarise the concern: "The analysis results show that South Africa's 2013/14 fuel portfolio is inefficient and has high risk. Following intense load shedding in 2007 and 2008, the entire portfolio capacity was increased by 3.7% and the coal, hydro, open cycle gas turbine (OCGT) stations' fuel costs increased substantially. The high fuel costs have been incurred in producing electricity, when the electricity demand that was not met by coal stations was largely met by OCGT stations.

"The efficient frontier based on fuel cost only shows that the efficient portfolios with minimum costs and low risk suggest that South Africa should move away from coal and nuclear, increase its exposure to hydro and pumped storage and reduce the exposure to OCGTs.

"Adding environmental levy to the fuel costs, the analysis showed little to no impact in encouraging the lower green emission technologies, indicating the limited effect on the levy in promoting green technologies and suggesting the need to reconsider this policy approach."

Income gap in South Africa

Depending on the variable used to measure inequality, the period, and the dataset, South Africa's GINI coefficient ranges from about 0.660 to 0.696. The GINI coefficient is the measure of income inequality, ranging from 0 to 1, where 0 is a perfectly equal society and a value of 1 represents a perfectly unequal society.

One of the leading sociological paradigms on crime, the theory of "relative deprivation", states that inequality breeds social tensions as the less well-off feel dispossessed when compared with wealthier people (see the work by Steven Stack for a critical view). The feeling of disadvantage and unfairness leads the poor to seek compensation and satisfaction by all means, including committing crimes against both poor and rich.

There is a myriad of reasons for the inequality pronounced in South Africa. Some of the key factors include skewed initial assets for people after 1994 in the form of, for example, capability, competence, language proficiency, skill to access to financial capital and ownership. All of these endowments serve to generate a highly unequal growth trajectory, ensuring that those households with these higher levels of endowments gained from the economic growth, where those with less gained little from the economy. Hereby the income widens, resulting in an increase of the GINI coefficient.

Our main economy is skill- and capital-intensive, thus not generating a sufficient impetus for low-wage jobs – which is key to both reducing unemployment and inequality.

By increasing the minimum wage and trying to combat crime, we are beating around the bush. Black empowerment failed (Piketty Thomas, 2015), we treat the symptoms and not the cause.

According to the political economist Thomas Piketty, education, formal and informal, is critical for reducing inequality in the end. Human capital accumulation is one possible mechanism through which to overcome a growth path where the rate of return on capital exceeds the rate of economic growth.

To generate a more equal growth path, thus equalising return and capital and economic growth, schooling and educational plays a crucial role in an economy's long-run growth (Adapted from Bhorat Haroon, 2015).

I challenge growers and avocado institutions to get actively involved with education and the development of skills on all levels for the benefit of generations to come. If we neglect this, the consequences will cost us dear.

CONCLUSION

I believe the risks and change the avocado growers, researchers and SAAGA personnel face should be treated as opportunities. Although a wealth of written information on avocado is available, even more can be discovered and learned from the experience gained by avocado growers over many years. SAAGA's philosophy provides a sound base for voluntary co-operation between growers, researchers, through the supply chain to the exporters on a national level, which seldom has been achieved in the South African agricultural industry. For this, I salute SAAGA's personnel and members and wish you a prosperous future.

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