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ABSTRACTS
KEYNOTE PRESENTATIONS

TAKING RESEARCH TO THE FARM TO ENSURE LONG-TERM SUSTAINABILITY

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Research is set within an extremely volatile, uncertain and turbulent South African economy and political atmosphere. With labour unrest and strikes in the mining- and agricultural sector influencing sector growth and stability, inflation at its highest levels since 2009 and Parliament reaching a new anti-climax in deliberations, consumer and producer confidence in the South African economy is at an all-time low. Add to this the challenges of the changing climate due to earth warming and the effects thereof, the demands of an ever growing World population and the need for food, especially on the African continent where millions of people are dying of hunger, the responsibility on the shoulders of researchers to contribute to positive inputs towards a sustainable agricultural future are immense.

Subsistence farmers, new entrée commercial farmers and first world commercial farmers, each grouping with a unique need for information and research are a reality in South Africa. Not only a challenge to maintain food security in a water scarce country, but also the challenge to keep arable land in production. This is almost an impossible mission within a country where research funding is not very high on the Government's priority list and agriculture is competing with other more urgent needs. Lack of funding for research could bring research to a standstill in South Africa or create new challenges for research to move closer to their clients, focus on their needs to increase production cost effectively and keep them sustainable and competitive.

The future of commercial farming in South Africa is depending on first world state of the art research in order to compete against producers around the world in export – and import markets. It would be foolish to depend on Government for protection in a country where cheap food for the people is the highest priority. That is why South African commercial farmers are not reluctant to contribute towards research but then the outcome of these research must enhance production and efficiency. This implies that researchers must be in a very close relationship with farmers or institutions representing the farmers. Research focused on the subsistence and new entrée farmers are a challenge on its own.

The challenge for me as farmer is: Adapt or die. We partner with the people who are able and capable of keeping us competitive in a very demanding world. The researcher we partner with must be focussed, know my needs, pro-active in his research and timely. Prepared to be competitive and adapt to the ever changing needs of industry. If he does not have an answer to my problem he must know someone somewhere who can help us. There is no time to re-invent the wheel in the world I am living in. Become my friend.

HERBICIDE-RESISTANT CROPS (GM) AND HERBICIDE-RESISTANT WEEDS – CAUSE AND EFFECT?

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The adoption of genetically modified (GM) herbicide-resistant crops, and the no-tillage practices revolutionized the weed management practices in several major crops. The most common trait was the bacterial CP4 gene endowing excellent resistance to glyphosate introduced into major crops such as soybeans, maize, cotton and oil seed rape. This plant modification allowed growers to rely solely on the outstanding performance of glyphosate and base their weed control programs on a single post-emergent herbicide while neglecting the benefits of residual herbicides and soil cultivation.

The evolution of glyphosate-resistant (GR) weeds was inevitable due to the strong selection pressure employed by the repeated use of the same herbicide under zero tillage conditions. The dimensions of the damage caused by aggressive weeds such as *Conyza* spp., *Amaranthus palmeri* and *Sorghum halepense* in soybean and cotton seriously threaten the sustainability of these crops in North and South America.

A plethora of 31 weed species, broadleaved and grasses, annuals and perennials in 24 different countries in all continents identified as GR. The mechanism of resistance in most plants is associated with sequestration of the herbicide away from the target site in the chloroplasts whereas in some weeds such as *A. palmeri* the resistance is based on over expression of the target enzyme – EPSPS.

The fact that GR has evolved in countries where GM crops are not grown indicates that the resistance is not crop-dependent but rather a direct result of misuse of glyphosate by the farmer. Glyphosate resistance is detected wherever repeated application of high doses of glyphosate is practiced; including nurseries, perennial crops such as orchards and plantations, roadsides and chemical fallow.

Given the fact that a broad-spectrum herbicide such as glyphosate is almost indispensable component of the weed management practices, several alternative managements are proposed in an attempt to slow down or even prevent further evolution of GR. Among the "best managements practices (BMP)" proposed were the combination of glyphosate with other herbicide mode of action applied in mixture or in sequence as "double knock-down" are hampered by the rapid evolution of multiple herbicide resistance.

The situation will be more complicated when the new GM crops stacked with three (or more) herbicide resistance traits (e.g., HPPD, 2,4-D, dicamba, glufosinate) will be offered to the farmer. It becomes clear that for combating herbicide-resistant weeds we should readopt and integrate non-chemical methods in our future weed management programs leading to a good agricultural practice (GAP).

Keywords: IWM, minimum tillage, rotation,

HINDRANCES TO EFFECTIVE DISSEMINATION AND IMPLEMENTATION OF SOIL INFORMATION IN SOUTH AFRICA

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INTRODUCTION

Short, medium and long term agricultural, ecological and economic sustainability are all threatened by inefficient dissemination of soil information in South Africa and resultant on farm implementation of incorrect or inappropriate technologies. Incorrect land suitability evaluation and land use planning are often key to this. The long term impacts of this situation are aggravated by the poor resilience (recovery potential) of a large proportion of South African soils – some having virtually no resilience. Several hindrances are responsible for this state of affairs regarding dissemination of information. These are discussed briefly.

MATERIALS AND METHODS

Many years of personal experience and studies of many publications during those years have been drawn upon in the preparation of this paper. Virtually all the key points addressed in the paper have been discussed comprehensively by Laker (2004). Although the title of that report refers only to water, soil received as much attention.

DISCUSSION AND CONCLUSIONS

Effective dissemination of research information requires effective links between researchers, “subject matter specialists”, extensionists and farmers. Research must be of high quality, but appropriate and relevant. Cooperative on-farm research should be an important component. In South Africa the effectiveness of agricultural research has suffered from the fragmentation of the research and extension scene since 1974, leading to the faculties of agriculture, later also the ARC, and Department of Agriculture becoming separate entities. After 1994 this was further compounded by creation of the autonomous provincial departments of agriculture, instead of the previous agro-ecologically based regions under the national department. In some provinces this virtually paralysed extension due to lack of links with research. Inadequate availability and accessibility of soil resource inventories are stumbling blocks to effective land suitability evaluation and land use planning. Suggestions to improve the situation are made.

Key words: Extension, research, sustainability.