

A FINANCIAL ANALYSIS OF COMBINING CROP ROTATIONS
SYSTEMS WITH APPROPRIATE POTENTIAL SOILS IN THE MIDDLE
SWARTLAND

By

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Abstract

The world's human population is exploding. Most of the growth is expected to happen in Africa. As a result the strain on natural resources will only increase, creating the need for sustainable agricultural practices to ensure food security. Producers are the link between the environment and food production but they are also under pressure due to an increasing cost-price squeeze. Food security depends on sustainable producers and research and development must contribute towards lowering the cost-price squeeze and increased production. Conservation Agriculture (CA) in grain production is an ideal sustainable practice developed to increase yields, profitability and to protect the environment. CA is adopted all over the world, including South Africa, especially in the Western Cape.

The adoption of CA in the Swartland is largely due to the lowering effect on the cost-price squeeze and more effective weed control through crop rotation. The Swartland region is the biggest wheat producing region in South Africa and plays an important role in the local and national economy. One of CA's main focus areas, crop rotation systems, is site-specific. Research in the Middle Swartland is based on the 20 year Langgewens research, a winter crop rotation trial. However, the trial research results leave a few concerns for Middle Swartland producers. The soil potential and mechanical needs for a typical farm varies from the trial research. In addition, the carrying capacity of pastures and the establishing cost of pastures are not entirely reflected in the research.

The aim of this study is to overcome these concerns and thus focuses on soil potential, which varies from the trial. The Delphi research method was used to determine the properties of a typical Middle Swartland farm. The results indicate that a typical farm will have 35% high-, 45% medium- and 20% low potential soil with a lowering effect on yields and carrying capacities, depending on the soil potential. The Delphi results, other relevant sources and previous research were used to construct a whole farm budget model taking into account the concerns.

The first task was to determine the most promising crop rotation system in terms of gross margin, cash flow and IRR (internal rate of return) when only implementing one crop rotation system on the whole farm, as mostly implemented by producers. System B (Canola, Wheat, Wheat, Wheat) showed the most promise. The second task was to determine the most promising crop rotation systems, when implemented on the different potential soils. System B showed the highest IRR for high- and medium potential soil, and System H (Wheat, Medics and Clovers, Wheat, Medics and Clovers with Saltbush) on low potential soil. The result of the mixed systems applied on the different potential soils was incorporated in one whole farm budget model with the same assumptions as for the case using only System B. The two alternatives were then put through a number of sensitivity tests/scenarios. The results indicated that combining crop rotation systems according to the soil potential will increase the gross margin, cash flow and IRR of the farm.

Uittreksel

Die wêreld se menslike bevolking is besig om te ontplof. Die meeste van die groei sal na verwagting in Afrika gebeur. As gevolg daarvan sal die druk op natuurlike hulpbronne net toeneem, wat die behoefte aan volhoubare landboupraktyke skep om voedselsekuriteit te verseker. Produsente is die skakel tussen die omgewing en voedselproduksie, maar hulle is ook onder druk as gevolg van 'n toenemende koste-prys knyp tang. Voedselsekuriteit hang af van volhoubare produsente en navorsing en ontwikkeling moet bydra tot die verlaging van die koste-prys knyp tang en verhoogde produksie. Bewaringslandbou in graanproduksie is 'n ideale volhoubare praktyk wat ontwikkel is om opbrengste en winsgewendheid te verhoog en die omgewing te beskerm. Bewaringslandbou is oor die hele wêreld aangeneem, insluitend Suid-Afrika, veral in die Wes-Kaap.

Die toepassing van bewaringslandbou in die Swartland is hoofsaaklik te danke aan die verlaging van die koste-prys knyp tang en meer effektiewe onkruidbeheer deur wisselbou. Die Swartland-streek is die grootste koringproduserende streek in Suid-Afrika en speel 'n belangrike rol in die plaaslike en nasionale ekonomie. Een van die hoof-fokusareas van bewaringslandbou, naamlik wisselboustelsels, is gebied-spesifiek. Navorsing in die Middel-Swartland is gegrond op die 20 jaar Langgewens navorsing, 'n wintergewas wisselbou proef. Die proef resultate laat egter 'n paar leemtes vir Middel Swartland produsente. Die grondpotensiaal en meganiese behoeftes van 'n tipiese plaas verskil van die proefnavorsing. Daarbenewens word die drakrag van weidings en die vestigingskoste van weidings nie heeltemal in die navorsing weerspieël nie.

Die doel van hierdie studie is om hierdie leemtes te oorkom en fokus dus op grondpotensiaal, wat wissel van die proef. Die Delphi-navorsingsmetode is gebruik om die eienskappe van 'n tipiese Middel Swartland-plaas te bepaal. Die resultate toon dat 'n tipiese plaas 35% hoë-, 45% medium- en 20% lae potensiële grond sal hê met 'n verlaging van die opbrengs en dra vermoë, afhangende van die grondpotensiaal. Die Delphi-uitslae, ander relevante bronne en vorige navorsing is gebruik om 'n hele plaasbegrotingsmodel saam te stel met inagneming van die tekortkominge.

Die eerste taak was om die mees belowendste wisselboustelsel te bepaal in terme van bruto marge, kontantvloei en IOK (interne opbrengskoers van kapitaal), wanneer slegs een wisselboustelsel op die hele plaas geïmplementeer word, soos meestal deur produsente geïmplementeer. Stelsel B (Canola, Koring, Koring, Koring) het die meeste belofte getoon. Die tweede taak was om die mees belowende wisselboustelsels te bepaal, wanneer dit op die verskillende potensiële gronde geïmplementeer word. Stelsel B het die hoogste IOK vir hoë- en medium potensiële gronde getoon, en Stelsel H (Koring, Medics en Klawers, Koring, Medics en Klawers met Soutbos) op lae potensiële gronde. Die resultaat van die gemengde stelsels wat op verskillende potensiële gronde toegepas word, is in een hele boerderybegrotingsmodel met dieselfde aannames ingesluit, as wat die geval was met slegs Stelsel B. Die twee alternatiewe is dan deur 'n aantal sensitiwiteitstoetse geplaas. Die resultate het aangedui dat die kombinerings van wisselboustelsels volgens die grondpotensiaal die bruto marge, kontantvloei en IOK van die plaas sal verhoog.

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