



# Rural conservation agriculture success story

High-Value Crop (HVC) production could potentially make the Eastern Cape's OR Tambo district municipality self-reliant in terms of food, according to **Joseph Sello Kau**, an agricultural economist at the ARC. **Roelof Bezuidenhout** reports.

**E**mpowering rural communities with the skills to grow fruit, vegetables and herbs using conservation agriculture (CA) methods can deliver positive economic returns. This is according to a recent PhD study by Joseph Sello Kau, on the return on investment in the ARC high-value crop production programme *Is Baya* in the poverty-stricken OR Tambo District Municipality.

Kau, an agricultural economist at the ARC, found that CA principles made it possible for a farmer to cultivate a mix of crops on a piece of land only 0,25ha to 2,5ha in size.

His research covered 90 households, of which 45 participated in the initial study, examining the demographics and farming profile of the

area. A total of 45 villages in the OR Tambo District Municipality were visited, and two households in each village were interviewed.

## TRADITIONAL METHODS

"[Originally] the farming methods were traditional, with a single commodity cultivated on the same piece of land season after season. These farmers knew nothing about CA and only 27% had formal training in agricultural production," Kau explains.

The ARC has been involved in the area for more than a decade and this has resulted in many positive outcomes. Most of the farmers in the *Is Baya* programme have adopted CA, and crop production has increased dramatically, both in intensity and diversity (see table).

**ABOVE:** The farm of Elliot and Nozamile Belem near Port St Johns. Beneficiaries of the ARC High-Value Crop production programme, the Belems have diversified their farming operation and now grow fruit in addition to farming maize and livestock.

**INSERT:** Villagers are adding value to their crops by producing jam, juice, essential oils and soap for the tourism industry. PHOTOS COURTESY OF JONATHAN REES OF PROOF COMMUNICATION

The 90 households surveyed in 2012 had a total of 10 750 trees between them, with an average of 119 trees per household, up from about 68 trees per household for the initial 45 farmers. Bananas made up 52% of the plantings, followed by oranges (21%), guavas (6%), and mangoes (5,5%).

"What helped tremendously was teaching the farmers about intercropping, such as planting beans in fruit orchards, and the value of insects in pollination," says Kau. "Before the ARC intervention, the few farmers who had money used chemicals to destroy pests, [albeit] indiscriminately. Others, due to poverty and lack of knowledge, had no pest control strategy in place whatsoever."

Nothumkile Mthambeki, based in Cwebeni Village in the Port St Johns Local Municipality, grows vegetables, industrial crops and deciduous and subtropical fruit using intercropping practices. She controls weeds by hoeing and using it as compost. Dishwashing liquid and mineral oil, rather than chemicals, are used for pest control.

## BENEFITS OF BEEKEEPING

The provincial department of agriculture and the Pick n Pay Foundation presented a beekeeping course for farmers in the area and hives are now placed in the orchards to assist with pollination. Farmers can also harvest the honey, and in Nothumkile's case, she earns approximately

## Is Baya programme

Despite good rainfall and fertile soil, the OR Tambo District Municipality is one of the poorest rural districts in the country.

Rolling hills limit arable land and discourage commercial agriculture, with the result that forestry dominates commercial activity.

Although there is potential for commercial-

scale irrigation projects, agriculture consists mostly of subsistence farming on communal land. This also presents management challenges.

While transport, mining and construction have shown growth, manufacturing is stagnating and therefore government and community services are the largest employers.

Under the ARC's *Is Baya* programme, farmers are steered towards sustainable production and agriculture as a livelihood. New citrus cultivars better suited to local conditions have been introduced. Small-scale farmers are taught to cultivate coffee (a newly-introduced crop) mangoes, lichees and macadamia nuts, as well as

the best banana harvesting and ripening techniques.

In this high-value crop programme, the Xhosa word *isibaya* (kraal) signifies an emphasis on developing households instead of individuals. Most of the project gardens are located in the backyards of homesteads so that family members can all participate in cultivating crops.

R30 000 a year from this enterprise.

Another farmer who benefited from the programme is Noleen Lottering of Ntlavukazi Village in the Inguza Hill Local Municipality. She says a major benefit of CA is that the integrity of the products is maintained and can thus be sold as organic produce.

Great emphasis is placed on protecting helpful insects. For example, Nelisa Mathandabuzo of Lutshaya Village smears grease onto an old cloth and places it at the base of citrus trees, thereby killing only the ants attacking her trees.

According to Kau, the internal rate of return for the 90-farm programme, based on farm income and food value, was 20% for the period from 1999 to 2012, and included establishment costs such as land, fencing, land clearing, digging holes, and tractor and equipment hire.

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**Growth in the number of fruit trees cultivated by the initial 45 farmers**

	Before intervention	After intervention	% Growth
Banana	534	1 293	142%
Orange	273	524	92%
Naartjie	34	126	270%
Guava	74	172	132%
Mango	145	216	50%
Avocado	28	47	68%
Litchi	16	35	119%
Pawpaw	8	36	350%
Macadamia	0	150	0%
Peach	68	87	28%
Pineapple	72	92	28%
Deciduous	19	18	-5%
Pecan nut	0	0	0%
Lemon	0	6	100%
<b>Average % growth</b>			<b>98%</b>

**ABOVE:** Elliot and Nozamide Belem are amongst the many farmers in the OR Tambo District Municipality who have benefited from *Is Baya*, the ARC high-value crop production intervention programme.

## BIO MONITOR

### More efficient biofuel synthesis

Micro-organisms are increasingly a factor in more efficient biofuel synthesis. Yeast strains can convert plant cellulose to bioethanol and GM bacteria to produce propane or butanol.



**WYNAND VAN DER WALT**

Yeasts are standard microbes used in fermentation. University of East Anglia scientists in the UK recently investigated 70 strains of yeast and discovered five that are resistant to furfural, a by-product toxic to yeast. Furfural appears during breakdown of plant cellulose, where heat and acidic conditions are required to produce sugars which are fermented into ethanol. These yeast strains can be used to produce bioethanol from agricultural waste. The most efficient strain was genetically shown to be distantly related to the yeast in rice wine production.

Propane is a volatile hydrocarbon fuel and is widely used as fuel in cars, domestic heating, gas burners and fridges. Following the discovery of an aldehyde deformylating enzyme (ADO) in an ancient bacterium and, recently, a microbial-assisted propane generating process using fatty acids, British scientists constructed and evaluated four separate synthetic pathways for the production of butanol and propane in genetically modified *E. coli* bacteria. The pathway was then altered to produce only butanol. Propane is produced when the ADO enzyme is used in combination with the best-performing engineered pathway and interrupts part of the pathway to butanol. This was achieved by replacing the gene for one key enzyme with a gene from another bacterium to synthesise a different enzyme. Further improvement used a specially engineered ADO enzyme that boosted the level of propane produced.

• Sources: *BiofuelsDigest*; [www.biotechforbiofuels.com](http://www.biotechforbiofuels.com), 2015.  
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