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IPM and the Citrus Industry in South Africa

Penny Urquhart

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The Gatekeeper Series produced by IIED's Sustainable Agriculture and Rural Livelihoods Programme aims to highlight key topics in the field of sustainable agriculture and resource management. Each paper reviews a selected issue of contemporary importance and draws preliminary conclusions for development that are particularly relevant for policymakers, researchers and planners. References are provided to important sources and background material. The Series is published three times a year – in April, August and December – and is supported by the Swedish International Development Cooperation Agency (Sida).

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Executive Summary

Agriculture is still one of the largest export industries in South Africa. Citrus is grown for export in a range of regions, including several former homelands which may have the potential to produce 20% of the citrus crop. The citrus sector presents good employment opportunities, particularly for disadvantaged communities, and schemes to establish emerging black farmers with citrus export crops are currently generating much interest. Thus there is potential for the industry to make a contribution to the pressing problem of rural development.

The South African citrus industry has made use, to varying degrees, of Integrated Pest Management (IPM) for some years. This is largely due to the high diversity of insect pests on citrus, and the growing problems of insecticide resistance; plus requirements of the international market, particularly with respect to pesticide residue regulations. To a large degree, the adoption of IPM for the export citrus industry may be seen as an example of environmentally-driven trade. This paper examines the scope for the citrus industry, and the marketing of IPM-grown citrus, to contribute to rural development.

The paper presents a preliminary assessment of the comparative costs and benefits of adopting IPM, with an emphasis on effects for small-scale farmers and workers. This shows that conscious effort will be required on the part of a range of bodies if the potential economic efficiency and social gains from the adoption of IPM are to be harnessed by both workers and farmers. Support is therefore needed in the following forms:

• Government should consider providing some form of support for the period of transition to IPM. This could also be a role for donor organisations of countries with stringent pesticide residue regulations. Particular attention should be paid to providing extension support, as well as management and technical training, for emerging farmers.

• To promote improved labour conditions and increased social responsibility, international buyers should be lobbied to include these issues in their orchard accreditation requirements. Increasing and harnessing consumer awareness of this shortfall is also needed.

• New farmer development schemes should target black women in particular, as they are the major farmers in the rural areas. These schemes should promote awareness of the possible cost effectiveness of an IPM approach, as well as health and safety benefits.

• A single consolidated standard for IPM in the industry will provide greater clarity to growers, as well as promote cost-effective independent monitoring. This should be explored through interaction between industry stakeholders such as co-operatives, marketers, growers associations, state departments and international buyers.

Finally, further research will be needed into the relative costs and benefits of IPM to small-scale farmers, to ascertain how this form of environmentally-driven trade may contribute to poverty alleviation.

IPM AND THE CITRUS INDUSTRY IN SOUTH AFRICA[1]

Penny Urquhart

There is much scope for the use of Integrated Pest Management in the South African citrus industry. There is also scope for the citrus industry to accept more black farmers through South Africa's land reform process. This paper examines the conditions that will be needed to support a fuller uptake of IPM, and to support black, and smallholder, farmers in the process.

The Nature of the Industry

Citrus is grown in South Africa in a range of regions, including the Northern Province, Mpumalanga, KwaZulu/Natal, North-West Province, Eastern Cape and Western Cape, plus small new plantings in the Northern Cape. These areas include several former homelands, which were estimated in 1993 to have the potential to produce 20% of the citrus crop.

Agriculture is still one of the largest export industries in South Africa. Export citrus made up 2.46% of the gross value of agricultural products in 1996 (National Department of Agriculture, 1998). Approximately 65% of the total crop is exported, with this proportion remaining relatively constant from year to year[2]. According to a recent World Bank report, the Southern African citrus industry is responsible for 7% of the world citrus export volume.

South African citrus farms generally range in size from 0.5 ha to 500 ha, although there are some even larger farms (6 000ha). Most, however, are medium-sized (average farm size for the Olifants River Valley is 40 ha), and most of them are family-owned. Currently, as for most of the agricultural sector, most commercial farms are still owned by whites. There are however some black citrus farmers in the Eastern Cape and Northern Province. The land reform programme of the Department of Land Affairs can be expected to change ownership patterns across farming sectors, albeit slowly.

The citrus sector presents good employment opportunities, particularly for disadvantaged communities (De Villiers, 1996). Reportedly, schemes to establish emerging black farmers with citrus export crops are currently generating much interest and will, if insti-

1. This paper is adapted from a case study contribution to Who Benefits? A Social Assessment of Environmentally Driven Trade, *a project funded by the UK Department for International Development and led and administered by the International Institute of Environment and Development (IIED).*
2. Personal communication: Bruce Cook, Quality Assurance Manager, Capespan.

tuted, serve to broaden the ownership base in the industry. Thus there is potential for the industry to make a contribution to the pressing problem of rural development. Some of these schemes have had their origins in agricultural development projects run by the former homeland governments, such as the Alice Kat Citrus Project (Box 1).[3]

The scope for the citrus industry, and the marketing of IPM-grown citrus to contribute to rural development, will be examined in more depth below.

Box 1. The Alice Kat Citrus Project

The Alice Kat Citrus Project in the Kat River area of the Eastern Cape was an agricultural development project initiated by the former Ciskei homeland. A number of farms previously owned by white farmers were bought up by a parastatal and allocated to approximately 16 black farmers. The idea was to transfer ownership to farmers after five years, subject to good performance. However, some 10 years down the line, many farmers are still waiting for title to be handed to them, and in the meantime are experiencing increasing financial problems. These are related to difficulty in accessing finance in the absence of secure title, high rates of interest charged by the former Ciskei Agricultural Bank, and structural problems set in place at initiation of the scheme such as the lack of support structures and training. Some farms had trees that had been planted in the 1930s, which meant that two years down the line, 30% of the trees had to be removed and new trees planted, thus greatly altering the income generating potential. Farmers struggling to pay their leases and repay loans lacked access to capital for replanting, meaning that development came to a standstill and debt climbed to unacceptable levels. Other difficulties included turning around a culture of entitlement amongst workers, and inability of farmers to retrench excessive labour which had been allowed to settle on the farms by the parastatal concerned. These serve to demotivate farmers, who have stated that *"we don't feel our authority on these farms".*

Use of IPM amongst the farmers of the Alice Kat Citrus Scheme is reportedly largely unconscious and driven by the high price of chemicals. However, there is growing interest, with farmers attending training courses offered by the co-op. The low levels of chemicals used by the black farmers in this area may facilitate a switch to IPM methods, as predator populations may still be sufficiently healthy for effective biological control.

Integrated Pest Management in the Citrus Industry

South Africa is host to a wider range of insect pests on citrus than elsewhere in the world, largely due to climatic conditions. There is, however, a correspondingly diverse and highly valuable complex of natural enemies occurring in association with these

3. A number of the less profitable of these projects have been closed by the new government. It is uncertain to what extent new schemes to establish black citrus farmers are being pursued by the current government.

pests (Hattingh, 1996a). For some years, the industry has made use, to varying degrees, of an Integrated Pest Management (IPM) approach. Early research of formal IPM techniques began in South Africa in the late 1960s, in line with international developments. The use of the approach increased with the development of organophosphate resistance by red scale, a major citrus pest.

However, one of the key promoters of IPM in the industry, Vaughan Hattingh of Capespan (formerly Outspan), has noted that perceptions of IPM vary greatly among growers and in some cases diverge from international trends (Hattingh, 1994). In the internationally interpreted sense, biocontrol of pests must be maximised in a pest management system for it to qualify as IPM (Box 2). However, many southern African growers fail to recognise this pivotal role of biological control and remain largely focused on chemical treatments (Hattingh, 1994). One could also go beyond the ecological and technological understanding of IPM towards one that includes social factors as well, although there is no broad recognition of this in the industry. However, see Box 4 for a case study description of the integrated and socially-oriented approach of one farm.

Box 2. Towards a Definition of IPM

Integrated Pest Management (IPM) is a dynamic, integrated approach involving a number of control techniques to manage pest populations in an ecologically sound fashion. It involves the use of biological control, cultural practices and chemical applications. IPM requires constant and thorough monitoring of the population levels of relevant pests. The choice of the path of action is dependent on the information collected - in other words, a feedback loop is an essential part of the system. This contrasts strongly with the 'calendar spraying' conventional approach to pest control. Biological control using predators, pathogens, parasites, disruptions in breeding cycles and plant modifications plays a central role in IPM. Some level of economic loss due to pests is acceptable and often unavoidable. Cultural practices include crop mixing, tilling and harvesting procedures, pruning and weed and ant control. Where chemicals are used, these should be narrow spectrum with a short residual effect, to encourage beneficial predators and parasitoids.

Why are Citrus Growers Adopting IPM?

There is much consensus that the adoption of IPM has been driven by three major factors:

- requirements of the international market, particularly with respect to pesticide residue regulations and criteria of buyers
- increasing resistance to pesticides on the part of pests
- environmental responsibility on the part of growers

Of the three causative factors, environmental responsibility seems to be the least significant, and the bottom line appears to be economic. This is more in the sense of retain-

ing a share in the market and keeping in business, rather than any great awareness on the part of growers in general as to possible economic efficiencies achievable through adoption of IPM approaches. There is a clear feeling that growers have been forced into change, rather than moving towards IPM methods from any moral obligation.

Market pressures for IPM

Most citrus growers try to export as much of their crop as possible because of the far greater returns obtained on the export market than the domestic market (Table 1). Increasingly strict pesticide residue regulations for export citrus are a major driving force in the adoption of IPM technologies. Markets with strict residue regulations and phytosanitary requirements are the USA and Japan. Apart from regulatory requirements, prerequisites of buyers, particularly specially selected outlets in the UK and Western Europe (such as Tesco and Sainsburys) have been identified as other important drivers of the increasing adoption of IPM.[4] Industry insiders note that across the board, buyers' requirements are more stringent than government regulations[5]. In the case of the UK multiples (eg. Sainsburys and Tesco), concern about the legal implications of failing to meet regulatory requirements is suggested as one reason for this situation. A further suggestion was that buyers are *"more pedantic"*. Moreover, the business base of these chains is too big to risk discovery of default. Buyers' requirements include lists of pesticides that may not be used, as well as size and quality specifications. Pressure from consumers, especially the green movement, is another important driver behind buyers' requirements. A respondent noted that while the purchasing power of green groups is limited, they can *"do a lot of damage"* when these issues get taken up by the media. There is a feeling that media coverage is playing a role in raising the awareness of the broader public around issues such as negative health and environmental effects of pesticides, and the relative advantages of organic production.

Citrus which cannot be exported because of quality, and, apparently, excess residue, is sent to the domestic market.

Under the previously regulated export market[6], all citrus produced was pooled at the packhouses and exported, and thus growers did not obtain a premium for IPM-produced fruit. With deregulation and increasing importer demand, exporters are now beginning to differentiate between fruit that is produced using IPM and that which makes greater use of pesticides. There are, however, ever fewer export markets that will

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4. Not all buyers have the same requirements. For instance in the Netherlands buyers do not specify any particular requirements related to use of IPM methods, thus only EU regulations would apply.
5. It would be necessary to examine documentation of buyers' requirements and of government regulations for a more rigorous comparison. Bearing in mind the volume of documentation this would entail, and the apparent difficulty in accessing this information, this was not possible within the present study.
6. For over 70 years, South African citrus was exported solely by the Southern African Co-operative Citrus Exchange under the Outspan brand. With widespread deregulation in 1997, brought about by the Agricultural Products Marketing Act, single channel marketing of export citrus ceased to exist, although Outspan still reportedly handles 70% of the export crop.

accept non-IPM produced fruit. Hence the growing recognition that IPM production, while currently allowing for a competitive advantage over non-IPM produced fruit, will be imperative in the future. As a spokesperson from one packhouse noted, "*IPM fruit, whether deciduous or citrus, is the way to go, in order to distinguish your fruit from your competitors. In the future it will, however, become the norm for the industry globally*".

Table 1 Price differentials obtained for export clementines in the 1998 season[7]

Market region	Price per 10.5 kg carton
Specially selected outlets - UK and Europe	R40.50
Wholesale - UK and Europe	R30.40
Eastern Europe	R25.35
USA	R50 - R100

Far greater prices obtained in the USA (Table 1) are related to the fact that this is a seasonally undersupplied market, with few southern hemisphere countries able to meet rigorous import requirements. With a population of approximately 225 million, the USA represents a potentially major market for South African citrus exports. Despite the conditional lifting of the longstanding phytosanitary ban on citrus imports from South Africa, stringent conditions still apply. The net effect of these, when combined with pesticide residue and quality requirements, is seen by many as a trade barrier (Box 3). While a number of factors complicate determining an average comparative price on the local market for Class 1 clementines, the figure is somewhere in the region of R10-12 per 10.5kg carton, indicating the lucrative nature of the export market.

Box 3. Sanitary Requirements that Inhibit IPM?

In the USA there is zero tolerance to false coddling moth presence in imported whole fruit. However, growers are prohibited from using insect growth regulators to control pests such as false coddling moth and red scale. This necessitates an IPM approach to manage these pests, which can be and is done successfully in the country. The technique used to control false coddling moth is the breeding and release of large amounts of false coddling moth parasitoids. However, for this to be successful, a low level of the pest population is required to maintain these natural enemies. This in turn means that it is practically impossible to have zero levels of false coddling moth. It is this catch-22 situation that is seen as a barrier to trade.

7. Information supplied by Ballie Wahl, Manager, Outspan International, Paarl.

Notwithstanding these constraints, the USA is clearly seen as the most desirable market at the moment. It also represents a comparative advantage for Western Cape growers, as this is the only area of the country cleared for export to the USA due to the absence of black spot disease.

Pest resistance

There is a growing realisation, through hard experience, that any chemical intervention has a temporary nature because of the ability of insect populations to acquire resistance. The development in the 1970s in much of the country of organophosphate resistance by red scale, traditionally seen as the key insect pest on citrus, was an initial encouragement for the adoption of an IPM approach. Since then, resistance has increased to other commonly used pesticides, forcing either adoption of IPM or the use of increasingly expensive alternative pesticides. However, while pesticides may be effective on one pest, they commonly have unexpected repercussions that necessitate what has been referred to as the *"insecticide treadmill"* (Hattingh, 1996a). For instance, while the local agro-chemical industry has promoted insect growth regulators (IGRs) as being ideal for integration with bio-intensive IPM, a number of economically important biocontrol agents are sensitive to these treatments. This means that desirable predators may be adversely affected by IGRs, leading to outbreaks of previously unimportant pests.

Extent of Adoption of IPM

Because of the varying and in some cases divergent definitions of IPM, it is difficult to quantify the extent of adoption of IPM exactly. However, most citrus farmers reportedly have this *"in the back of their mind"*, in the words of one researcher and extensionist. Another industry source stated that *"everyone wants to get on board"*. In the sense of bio-intensive IPM, as described in Box 2, it was estimated that approximately 15% of the production in the Olifants River Valley was produced in this way[8], but figures for the rest of the country are unknown.

While both large and small farms are making use of IPM, farm size does have an effect on technology adoption. On the one hand, the intensity of management required for IPM is easier to attain on a smaller farm[9]. Larger farms (of around 6 000ha) in general tend to be more chemically-oriented in their approach. However, larger farms generally also have more resources available to implement biological control measures, although intensive management is more complicated because of their size. One of the leaders in bio-intensive IPM is Hexrivier Citrus in the Olifants River Valley, which is moving towards complete biological control. This farm has several orchards in which no spray-

8. The Olifants River Valley produces 80% of the citrus of the Western Cape province, which has roughly 18% by area of the total citrus plantings in South Africa.
9. Personal communication: Vaughan Hattingh, Senior Research Entomologist, Outspan Citrus Centre, Nelspruit.

ing has taken place for four or five seasons. Hexrivier Citrus consists of a total of 470 ha of citrus, spread over five farms, each with its own manager.

Thus, while both small and large-scale commercial farmers appear to be adopting IPM technologies, there are varying constraints and opportunities associated with farm size. However, a more significant criterion of success for adoption of IPM appears to be a business-orientated approach to farming, with a willingness to take on intensive management and administration. This is because IPM requires ongoing monitoring of pest and predator levels and a far more sophisticated approach to pest management than the fixed spray programmes of a chemical orientation to pest control.

This indicates that given the willingness to take on intensive management, together with appropriate training and ongoing support during the early years, IPM can be successfully adopted by emerging black farmers. While there is evidence that new entrants to farming are taking on an IPM approach, it is still too early to assess the success of adoption of IPM by new farmers.

Certifying and Monitoring IPM

There is as yet no consolidated approach within the country to certification and monitoring of IPM. Recent deregulation of marketing within the industry, while it may have other positive benefits, would seem to mitigate against, firstly, a unified understanding of the term, and secondly, a single accreditation system. The latter would be of benefit for growers and packhouses, which are currently having to negotiate a minefield of differing requirements on the part of foreign governments and buyers. At the moment, most monitoring is done by growers themselves, encouraged by the distribution systems of the large packhouses.

If an approach to IPM which first and foremost maximises biological control is not adopted, this may result in merely changing the types of chemicals used rather than reducing quantities. Confusion and divergent understanding as to what constitutes an IPM approach on the part of growers is clearly in the interest of the agrochemical companies. These issues have led some to consider much of IPM internationally as a 'con'[10].

Outspan (now Capespan) developed an orchard accreditation system some years ago as part of their quality assurance programme. While this was not originally linked to IPM, it appears to have been modified recently for export to markets with strict pesticide residue regulations. These modified criteria for orchard accreditation, based on requirements of the market (notably buyers like Tesco) and developed by Outspan, will be monitored by self-audit by growers and/or packhouses. Additionally, inspectors from large buyers visit orchards on an ad hoc basis.

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10. Personal communication: Professor David Gibbon, Department of Rural Development Studies, Uppsala, Sweden.

In some cases, orchard accreditation requirements are being adapted to local conditions, as for instance, by the Goede Hoop Citrus Co-op Ltd. (Box 4).

Box 4. The Goede Hoop Citrus Co-op Ltd: Promoting sustainable citrus production

The Goede Hoop Citrus Co-op represents about 180 growers, who cultivate citrus on 5 300 ha in the Olifants River Valley of the Western Cape province. It is the co-operative with the second highest export volume countrywide. In order to build up a relationship with its major customers, Goede Hoop now requires farmers to enter into a contract stipulating that each of their orchards must be accredited before they can sell to the Co-op. The accreditation system of the Co-op reportedly goes beyond residue regulation requirements, as well as the accreditation criteria developed by Outspan. The Co-op has promoted IPM technologies amongst growers as a way to add value and provide a better service to the market. In support of this it has developed an insectary to breed parasitoids and predators for use in biological control. Currently at least 80 growers are purchasing false coddling moth parasitoids from the Co-op, indicating their faith in the IPM approach.

Goede Hoop has recently developed a new system whereby producers will receive a premium for quality and where maximum value-adding will take place. Growers are required to present a spraying programme to the Co-op, which at this stage does not test for residues, but relies on grower disclosure. The Co-op reportedly has three different channels for fruit:

- non-export: lower quality fruit, residues, incorrect sprays
- normal export: destined for Canada and the Far East
- special markets: 'quality' fruit for multiples like Sainsburys and Tesco

Fruit destined for special markets will receive a quality premium in the Co-op. From the new season, growers will receive a fruit quality feedback statement after delivery of fruit, which will indicate for which market their fruit is destined. Goede Hoop has found that growers with the worst quality fruit have higher spraying costs than those with good quality fruit, indicating that quality depends more on good management than chemicals, and is associated with lower production costs.

Accreditation requirements imposed by markets do not explicitly include social factors or labour practices, but rather concentrate on application of plant protection substances, pest monitoring, and other technical issues. Whilst there is some emphasis on management of the harvesting process, which implies increased training for workers, no report is required of labour conditions. Foreign inspectors reportedly do form an opinion of this, but it is not a major focus[11]. However, one farm in the Western Cape province has decided to extend the concept and practice of IPM beyond the ecological and technological to include social variables (Box 5).

11. Personal communication: Gabrie van Eeden, Technical Manager, Goede Hoop Citrus Co-op Ltd.

Box 5. A Truly Integrated Approach to IPM

Skaaprivier Plaas is a deciduous fruit farm in the Ceres area of the Western Cape province. The farming operation consists of the production unit, which is a company, and a packing and marketing company which packs citrus for direct marketing into Europe. As there is no uniform international set of standards for IPM, the business is currently developing its own standards, which include not only issues around pesticides and technology, but also environmental concern, soil analysis, hygiene and safety aspects, as well as social and workplace practices. Skaaprivier is currently exporting directly to a French company that markets specifically IPM-produced fruit, for which a small premium is paid. As this is a recent development, it is not yet clear whether this will translate into any real economic benefit for the business.

Fifteen years ago the owners of Skaaprivier Plaas instituted a programme to bring women into the business as permanent employees with all benefits and training opportunities. From a baseline of zero, 65% of the employees are now women. These women also became shareholders with their male counterparts in the packing and marketing company. The motivation of the owners in developing this shareholding scheme was to move towards economic empowerment of previously disadvantaged employees. As Ingrid Wolfaardt explains: *"It was the logical evolution of many years, moving from empowerment in the workplace with regard to responsibility and accountability to shareholding. … Business in South Africa will only survive if one is abundant in sharing, sharing of power, of information, of skills and of profits."* Thus one may trace the social and empowerment benefits experienced by workers on Skaaprivier back to the vision, dedication and spirit of reconciliation of the owners, rather than to any benefits arising naturally from the use of an IPM approach.

A national organic certification system is currently being established for South Africa. According to Capespan, there is an international market for organic citrus production, and it is Capespan's objective that 5% of export volume should be organically produced fruit. Motivation for this is that prices realised to date are reportedly *"extremely high"* and it is perceived to be an important market segment to access and supply. It appears that ability to supply organic produce to supermarkets may assist in accessing a market for conventional fruit as well. Europe is currently a growing market for organic produce, with the greatest expansion occurring in the UK, Germany, Austria, Switzerland and Italy (Capespan, 1998). The UK multiples such as Sainsburys and Tesco have customer care programmes that have highlighted the demand for organic produce. Consequently it appears that interested growers would have to meet the EU regulations for organic production, as well as becoming certified with an approved certification body. However, because of the large number of pests that the South African citrus industry must contend with, meeting these requirements will not be easy. A successful farmer moving increasingly towards pure biological control notes that the EU requirements for organic certification could not be achieved under South African conditions. It therefore appears doubtful whether citrus growers in South Africa will be able to harness the

lucrative benefits of supplying the organic market, unless international markets are prepared to accept more locally appropriate organic certification criteria.

The Costs and Benefits of Adopting IPM

Costs

The costs of adopting IPM can be divided into transition costs and ongoing costs.

Transition to IPM

Transition from a chemical approach to an IPM system results in short-term drops in yield, and consequently, income, as it can take a couple of years for pest/predator populations to achieve balance. Negative transition effects can be reduced by adopting a gradual, orchard-by-orchard transition process.

However, one farmer noted that change over from chemical to biological control can be done without any short-term drop in production by systematically moving from hard to soft chemicals (Citrus Journal, 1996). In some areas, transition is less problematic than others, depending on local conditions. For instance in the Eastern Cape, transition is less complicated than in more northerly areas, as fewer pests and diseases occur that have to be controlled by pesticides that can be detrimental to natural enemies of non-target pests (Farmers' Weekly, 1994).

Apart from economic costs, transition necessitates courage on the part of the farmer and a willingness to step into the unknown, away from the comfort zone of the 'calendar spray' framework. Thus there can be short-term effects on farmer confidence.

Ongoing costs

There is consensus that adopting IPM requires more intensive management, better management skills, and much extra administration. Medium average farm size and the high degree of family ownership means that intensive management is possible in theory. While this may be true in some cases, a number of industry stakeholders interviewed feel that many farmers are not willing to embrace the extra burden of intensive management required by IPM approaches, and are too dependent on support structures for minor pest management decisions. In the words of one participant with many years' experience in the industry: *"They want to spray and go on holiday."* This may lead to significant changes to current ownership patterns, as international buyers increasingly demand fruit produced using IPM. In the Olifants River Valley, for example, it is estimated that within five years 30% of current farmers will be off their farms, as decreasing viability from failure to adopt more management intensive approaches will force farm sales. These are likely to be taken over by people who do want to manage, monitor

and make their own decisions.

It does not appear as though any on-farm jobs are shed though adoption of IPM methods, but rather that labour costs are switched between activities. For instance, IPM requires less spraying, but may require additional labour to erect ant barriers around the stems of trees. There may however be job losses within the agro-chemical sector from a large-scale adoption of bio-intensive IPM. However, jobs will be created through, for instance, the establishment of insectaries to supply predators and parasitoids for biological control methods.

Benefits

Economic, environmental and social benefits arise from adopting an IPM approach to citrus production.

Economic efficiency

Several studies have demonstrated the economic advantages of IPM over a chemical-oriented approach (Hattingh, 1994). A detailed study of the respective costs of an IPM versus a chemical-oriented approach for a number of different regions in South Africa demonstrates an average cost saving in the order of 10% for IPM production (Hattingh, 1996b). This is in keeping with the findings of an eight year research project in California. In Australia, reported savings of 37% to 53% on pest control as a result of successful IPM implementation have been achieved in some areas.

Cost efficiency of IPM production is related to reduced input costs and higher prices obtainable for pesticide-free fruit. However, the fact that fruit produced primarily through biocontrol methods is as yet not marketed separately means that this potential economic advantage is not yet optimally harnessed. Orchard accreditation requirements will begin to redress this issue, although there will be associated higher administration costs for growers and exporting agents.

Despite what appears to be demonstrated cost efficiency, southern African growers remain reluctant to adopt the approach (Hattingh, 1996b). Management on a leading biocontrol oriented farm included in this study felt that this cost efficiency was not apparent in the short-term.

Environmental benefits

Environmental benefits of a switch from chemical to biological pest management are well known and have served as a major stimulus for the development of IPM technology. They include reduced pesticide pollution of land and water, improved functioning of ecosystems, and reduced effects on land and aquatic fauna. The latter benefit refers to the reduction in biomagnification, which is the increased concentration in pesticide

residues in animals higher up in the food chain (Sagar, 1991). Clearly, the costs of many negative environmental effects are currently not quantified and not included within conventional cost-benefit analyses. Should such accounting be undertaken more holistically, using larger scales and longer time frames, the profitability of much chemical-intensive farming may be brought into question.

Social benefits

Significant health and safety benefits are associated with the use of biological as opposed to chemical pest control. While many farmers, extensionists and environmental health officials interviewed downplayed the health risks associated with pesticide use on farms, there is a growing body of research that indicates the opposite. South African agriculture uses more pesticides than any other sub-Saharan country, which may have adverse effects not only on farm workers, but also on their families and other farm dwellers, workers who manufacture pesticides, and health workers involved in pest control (London and Rother, 1998). While the citrus industry has a lower consumption of agrochemicals than the deciduous fruit sector, their costs increased rapidly as a proportion of production expenses in the early 1990s (London and Myers, 1995). In addition to acute and delayed effects that can lead to fatalities, chronic effects of pesticide poisoning include cancers, nerve and brain damage, immune deficiencies, infertility and birth defects (London and Rother, 1998). Research conducted in the Western Cape indicated that it is women who are most often affected by pesticide workplace exposure. A survey of farm workers on 40 farms in the Western Cape in 1992 found that no workers received any formal training on pesticides (London and Rother, 1998).

The adoption of IPM requires increased monitoring of the farm, resulting in increased understanding and knowledge of intelligent pest management. Farm workers trained as orchard monitors acquire specialised knowledge as well as movement to a higher pay level. Orchard monitors who have undergone specialised training indicated that this had made a drastic difference to their jobs. Apart from the obvious change in daily activities, from general farm work to monitoring of pests and predators, they had moved up one pay grade, and also felt they now had more responsibility. However, the empowerment possibilities of this may not always be utilised because of the attitude of *baasskap*[12] on the part of some farmers. A union cautions that the benefits of training may in fact be exploited by some farmers, who may hire out their own cheap labour to neighbours at a profit, with the workers receiving no share of the gains. Furthermore, even on a large farm, only a handful of workers would receive this training, thus this benefit is fairly isolated.

It appears that adoption of an IPM approach may have a positive gender impact. Women are traditionally employed as seasonal labour during winter, for fruit picking and in the

12. A direct translation from the Afrikaans would be 'boss-ship', with obvious negative connotations.

packhouses. With an IPM approach to pest management, a large proportion of labour costs is switched to ant control, which involves placing a physical barrier around the stems of trees. While this is unskilled work, it is carried out in summer, providing an opportunity for women on the farm to earn an income throughout the year.

Can IPM in the Citrus Industry Contribute to Rural Development?

This preliminary study has revealed that there is little evidence of any contribution of IPM in the citrus industry to poverty alleviation, apart from creating increased employment opportunities for rural women. As they are often the poorest of the poor, this effect is not unimportant. However, where IPM has resulted in increased profits to the farmer through exploitation of new and more profitable markets, there is no evidence that this has resulted in any additional benefits to farm workers.

There is no simple answer to the question of whether adopting an IPM approach increases or decreases the entrance barrier to the citrus industry for new black farmers. There are many variables to consider. At first glance, IPM may appear to hinder entry as it is knowledge and management intensive. However, citrus production itself is capital intensive, which may constitute an obstacle for emerging farmers. The proven cost efficiency of IPM could help to overcome this entry barrier into the industry. However, the right kind of ongoing support in the form of training and financial cushioning for the transition period will be needed. Where new farmers have acquired or regained land under the land reform programme, this necessitates more effective co-ordination than presently exists between land and agricultural state departments.

A conflicting opinion holds that with lower input costs, together with lower costs for diesel and maintenance than for conventional chemical control, IPM may be seen as a logical way to go for resource-poor emerging farmers, provided subsidised training and initial support is available. This is assuming that the fairly expensive machinery required to apply just the right dose of chemical for optimal IPM, when spraying does become necessary, would not be another obstacle. These multiple variables, together with other social effects, necessitate more careful study before this key question can be answered. What is clear from this preliminary study is that adoption of IPM provides no guarantee that potential economic efficiency gains will benefit workers, or that any social benefits will be harnessed by both workers and farmers. Conscious effort is required to achieve these ends.

Conclusion

What can be done to increase benefits and reduce costs associated with the adoption of IPM in citrus farming, as well as to distribute both costs and benefits more equitably? Clearly, a major recommendation would be that additional research be funded

and undertaken in order to explore in detail the preliminary findings presented here. Interaction with stakeholders in the course of researching this case study, supported by the literature review, highlights the lack of attention paid to identifying and understanding the social impacts of adoption of this technology.

Additional recommendations are as follows:

• To encourage the adoption of IPM technologies by farmers, government should consider providing some form of support for the transition period. This could also be a role for donor organisations of countries with stringent pesticide residue regulations. In order to ensure benefits arising from IPM are distributed more equitably, particular attention should be paid to providing extension support, as well as management and technical training, for emerging farmers.

• To promote improved labour conditions and increased social responsibility, international buyers should be lobbied to include these issues in their orchard accreditation requirements. Increasing and harnessing consumer awareness of this shortfall may facilitate this process.

• New farmer development schemes should target black women in particular, as they are the major farmers in the rural areas. These schemes should promote awareness of the possible cost effectiveness of an IPM approach, as well as health and safety benefits.

• A single consolidated standard for IPM in the industry will provide greater clarity to growers, as well as promote cost-effective independent monitoring. This should be explored through interaction between industry stakeholders such as co-operatives, marketers, growers associations, state departments and international buyers.

With deregulation of the industry, the traditional extension provider, Outspan, appears to be less keen to expend vast resources on small-scale farmers at the expense of the established farmers, who constitute their bread and butter[13]. It is uncertain whether government extension services would be willing and able to take on this role for the citrus industry.

Judging by the lack of information, research and thought into social issues associated with the adoption of IPM in the citrus industry in South Africa, this case study is indeed timely. The present organisational flux in the industry, together with recent changes in government following from the second democratic elections, may combine to present a window of opportunity for bringing results and identified gaps in research and supporting policy to the attention of policy makers in South Africa.

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13. It must be emphasised that this is an impression gained, rather than an official policy position of Outspan. Further study is required into the question of provision of extension and other support services for emerging citrus farmers.

References

Capespan. 1998. *Capespan Organics: Grower Summary.* Information brochure. Capespan, Belville.

Citrus Journal. 1996. 25 years of integrated pest management. *Citrus Journal,* Special Edition, 15 May 1996.

De Villiers, T. 1996. SA sitrusbedryf hoogs doeltreffend. *Finansies & Tegniek,* 48 (20):59, 17 May 1996.

Farmers' Weekly. 1994. Saving millions with IPM. *Farmers' Weekly,* 11 November 1994.

Hattingh, V. 1994. IPM on citrus in southern Africa. *Citrus Journal* 4 (3):21-24, 31 July 1994.

Hattingh, V. 1996a. The use of insect growth regulators in integrated pest management of citrus in southern Africa. *Citrus Journal,* Special Edition, 6 (2):14-17, 15 May 1996.

Hattingh, V. 1996b. Comparison between the cost of an IPM and a chemical approach to pest management. *Citrus Journal,* Special Edition, 6 (2):20-28, 15 May 1996.

London, L. and Myers, J. 1995. Agrichemical usage patterns and workplace exposure in the major farming sectors in the southern region of South Africa. *South African Journal of Science* (91):515-522.

London, L. and Rother, A. 1998. Pesticides - time to take action. *SA Labour Bulletin* 22 (5):73-79.

National Department of Agriculture. 1998. *Annual Report: 1 April 1996 to 31 March 1997.* National Department of Agriculture, Pretoria.

Sagar, A.D. 1991. Pest control strategies: concerns, issues, and options. *Environmental Impact Assessment Review* 11 (3):257-279.

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