

Printed Information Needs of Small-Scale Organic Farmers in KwaZulu-Natal

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Four resource-poor farmer groups in KwaZulu-Natal participated in a study to explore how to meet their need for printed agricultural information materials (PAIMs) to promote small-scale commercial organic farming. Participatory rural appraisal methods (focus groups, semi-structured questions, information tabulation, voting, ranking, sorting and observation) were used to determine how farmers access innovative agricultural information, their preferences for information channels, the effect of literacy and language on their use of printed information, and the provision of relevant printed information materials. Participants evaluated five PAIMs. The findings show that there is a critical need

for appropriately repackaged PAIMs to reach farmers. Intermediaries, on whom farmers rely for external (mostly oral) information, could expose farmers to alternative information channels and/or sources. Materials written in the farmers' first language, isiZulu, were preferred, while at least one functionally literate farmer was a member of each of the participating groups, thereby facilitating group literacy. The study concludes that printed materials on their own are not sufficient to meet small-scale farmers' new information needs, and recommends a collaborative, action research approach to ensure that farmers are involved in developing their agricultural knowledge and information systems.

Background and aim

Small-scale farmers in KwaZulu-Natal, who are among the poorest rural inhabitants in South Africa (May 1998), face many challenges in their efforts to increase their income and overcome food insecurity (Ortmann & Machete 2003). While farming activities cannot generate all the income rural households need to escape chronic poverty (Erskine 1996, 38), one possibility to generate much needed income is to convert to organic production and tap into high-value organic produce markets (Harris *et al.* 2001, 51). However, organic production poses many challenges for small-scale farmers (Kotschi 2003, 29) who require assistance to secure access to land, financial assistance and access to input and output markets (Viljoen *et al.* 2002, 26; Kirsten *et al.* 2003). Information is one of

the most valuable resources in rural development (Carter 1999; Meyer 2003; Morrow *et al.* 2002), and can assist small-scale farmers make informed decisions and take appropriate action to further organic farming and marketing (Harris *et al.* 2001, 35).

Communication and information provision for rural development and small-scale agriculture are well researched and documented. For example, Mundy and Sultan (2001) report on many innovative communication initiatives in Africa, the Caribbean and the Pacific that are making positive contributions to development in those regions. Examples include collaboration between farmers, researchers and extensionists to encourage experimentation and the sharing of traditional knowledge, a well-stocked non-governmental organisation library in Nairobi, Kenya that is open to

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the public, and various print media and information communication technologies (ICTs) serving rural people. In order to appropriately disseminate information in developing countries, Saracevic and Wood (1981) highlight the need for repackaging scientific and technical information, while Meyer and Boon (2003) stress the importance of combining indigenous knowledge with external information through the use of communication mechanisms with which target groups are familiar. Mchombu's (2002) research into the information needs of rural African peoples has led to publication of a comprehensive handbook on facilitating community development through community information resource centres.

Information for rural or agricultural development can be delivered in a number of forms, including by oral or verbal means and/or printed literature and electronic communication technologies (Meyer 2002; Morrow 2002; Batjes-Sinclair 2003). There are advantages and limitations to these various channels of information exchange. Oral forms are clearly favoured by rural communities in South Africa (Bembridge & Tshikolomo 1992, 82; Leach 2001b, 57) because of long oral traditions and relatively low levels of literacy. However, drawbacks of verbal communication are that people may not recall exactly what was said in a given situation, and the content of such verbal exchanges is restricted to those present (Meyer 2002b, 221). Radio, tape recorders and videos are examples of electronic media used successfully in rural areas, while the growing ICT movement promises better access to information via the Internet, especially the World Wide Web (Food and Agriculture Organisation (FAO) 1989; Van Crowder et al. 1998). Unfortunately, resource-poor farmers seldom have access to computers or sufficient telecommunication infrastructure, and lack of computer literacy may prevent full access to electronic text (Morrow 2002). Snyman and Snyman (2002) describe the South African government's struggle to improve information quality and availability in rural areas through multi-purpose community centres (MPCC) and ascribe failures to poor management of MPCCs by inadequately trained managers, lack of information technology (IT) skills and technical problems. Although illiteracy has been cited as a major barrier to the use of printed information materials, they have been found to be useful tools in promoting

sustainable agriculture and facilitating networking (Carter 1999; Mbozi 2002), and primarily as a support to messages delivered orally or by other channels (Saracevic & Wood 1981). Rural people regard printed materials as authoritative sources of information (Leach 2001b, 55), despite low levels of literacy, a general lack of availability of such materials in rural areas (Kaniki 1989; Waters-Bayer 2002), and a dearth of technical and research information repackaged appropriately for rural audiences.

This study was motivated by the fact that:

- the KwaZulu-Natal provincial Department of Agriculture does not offer training in organic farming methods for staff who provide extension support to small-scale farmers. Thus, extension personnel are not equipped to guide farmers through the customary oral channels.
- information, knowledge and skills, of a technical nature, are required to operate within the commercial organic production and marketing arena. Most of this information (for instance, instructions and records for certification, details of new farming practices, market information and records of transactions) will be in a printed form, forcing semi-literate farmers converting to organic production and marketing to engage with such materials;
- many publications on small-scale farming are produced but there is little evidence of farmers referring to and implementing information found in printed agricultural materials; and
- given that studies are increasingly being conducted into the value and use of ICTs in rural development, what relevance does printed information have for semi-literate farmers?

Despite the volume of printed agricultural materials available in South Africa (produced by non-governmental organisations (NGOs) and the South African government through national and provincial Departments of Agriculture), only a small proportion of the country's 1.25 million small-scale farmers reportedly have access to written information on agriculture (Bembridge 1997). Similarly, research with farmers in Uganda and Ghana revealed an "enormous, largely unmet hunger for relevant agricultural information through the printed word" (Carter 1999, 67). Printed agricultural materials appear to have had little impact on South Africa's small-scale farmers due to reasons that include the variable quality of publications and their ad hoc distribution (Bembridge 1997). It is also extremely difficult to quantify the value of information delivered to users,

Table 1. Summary of selected information use propositions (after Poole 1985)

Proposition		Explanation
Information use is a function of:	need	Use of information is dependent on need
	user awareness	For information to be put to some purpose a user needs to be aware of the existence of that information
Information channel use is a function of:	accessibility	A direct relationship exists between the actual use of a channel and the convenience with which it can be used
	credibility	People use channels which they trust
	need	Use is based on need in order to reduce uncertainty
	user awareness	As knowledge of certain channels and their abilities increases, so too does their use
	channel noise	Avoidance of the use of a channel if it contains information encoded in a language foreign to users

which can usually only be done through the use of indirect measures of impact or anecdotal evidence (Saracevic & Wood 1981, 278). This points to the complex field of information use, including factors that influence use and channel use, for example accessibility, credibility, noise, user awareness and need, as proposed by Poole (1985). A summary of selected information use propositions highlights that the use of information is dependent on any one of a number of factors (see Table 1).

Small-scale farmers in KwaZulu-Natal, who are converting to commercial organic production and marketing, are generally knowledgeable about indigenous farming practices such as crop rotation and intercropping (Modi 2003). However, because of the complex nature of farming, including the need to employ environmentally sound farming practices to protect the natural resource base for food production in the future, farmers' knowledge and information need regular supplementing (Van Crowder *et al.* 1998). This study was conducted to determine, from the farmers' perspective, how printed information materials could meet these new information needs. The following research questions were posed:

- a. How do small-scale farmers access innovative, research-based information on agriculture?
- b. Do small-scale farmers have a preference for the channel through which they receive information?
- c. What effect does literacy and language have on small-scale farmers' use of printed information?

- d. Is there adequate provision of printed information on organic farming and marketing for small-scale farmers in their own language?

Morris and Stilwell (2003) suggest that farmers are in the best position to determine whether an information product meets their needs. Previous findings that context specific information is of greater value to farmers than publications of a general nature (Bembridge 1997) underscore recommendations that farmers should participate in the creation of information products, thereby incorporating their own experience and local knowledge into printed materials (Otsyina & Rosenberg 1997; Carter 1999). It was anticipated that guidelines for the provision of appropriately repackaged printed information on organic farming, marketing and certification, based on farmers' experience and perceptions, could inform the provision of printed agricultural information materials relevant to organic production.

Methodology

Four groups of small-scale farmers from Umbumbulu, Tugela Ferry, KwaMashu and Muden in KwaZulu-Natal, who were converting to or experimenting with organic farming, participated in the study. Table 2 outlines the demographic profile of the groups. Purposive sampling was used to select small-scale farmer groups that were converting to or experimenting with organic farming and marketing, members of which were invited to attend a workshop in each area.

Table 2. Demographic profile of participating small-scale farmer groups in KwaZulu-Natal, June and July, 2003

	Ezemvelo Farmers' Organisation	Tugela Ferry Plantation farmers	Vukusakhe and Siyenza Garden Clubs	Muden Irrigation Scheme farmers
Location	Umbumbulu	Tugela Ferry	KwaMashu	Muden
Approximate number of farmers per group	54	32	20	22
Study participants	18	13	13	2
Supporting Organisation	University of Natal, Discipline of Crop Science	Farmer Support Group, University of Natal	Newlands Mashu Permaculture Learning Centre	Farmer Support Group, University of Natal
Farming system	Individual homestead gardens of up to five hectares	Between one and 10 beds per farmer in the plantations	Collective farming in community gardens	Between one and 10 beds per farmer in the irrigation scheme
Marketing	Collective marketing and sale of produce	Individual sales	Personal use, donations and collective sales	Individual sales
Organic status	Organic "certification in conversion"	Experimenting with organic farming methods	Using permaculture methods	Experimenting with organic farming methods

Forty-six volunteers participated in the study, representing diversity in age (elders and youth), gender, authority levels (leaders and ordinary members) and literacy levels (those who had not attended school through to those who had completed high school). Data and information were gathered during focus group discussions using guiding questions, information tabulation, ranking, sorting, voting and observation. The farmers evaluated five PAIMs produced for semi-literate readers, namely, a poster, newsletter, newspaper, books and step-by-step manual (see Table 3).

Results and discussion

In this section the results of the study will be discussed, as they relate to farmers' access to external information, their preferences for information channels, and the effect of literacy and language on their use of printed information (including education levels, visual literacy and language preferences). The results of the farmers' evaluation of printed information materials is reported on and discussed, as are the provision of printed materials for potential small-scale commercial organic production and the information identified by the farmers as necessary.

Farmers' access to innovative, research-based information

Many participating farmers reported having been taught to farm by their elders, and approached other farmers and neighbours for advice on specific farming problems. However, the results showed that intermediaries such as NGO and church-based development facilitators, university researchers and the KwaZulu-Natal Department of Agriculture and Environmental Affairs' extension officers were the main sources of and/or channels to access innovative, research-based agricultural information for farmers.

Intermediaries shared information with farmers mainly through interpersonal channels including: workshops, training programmes and demonstrations. These were the most frequently mentioned avenues for accessing advice on organic production and marketing. Intermediaries also played a role in combining local knowledge and expertise with innovative, research-based information through on-farm experiments and project activities, such as cross visits (visits by farmers to other farming communities and training and business facilities, arranged by intermediaries). Printed materials reflecting such synergistic knowledge and

Table 3. Key characteristics of the five categories of printed information materials evaluated by the farmers

Characteristics	Newspaper	Newsletter	Books	Poster	Step-by-step manual
Number of pages	4	24	250 & 560	1	44
A2				X	
A3	X				X
A4		X	X		
A5			X		
Small typeface					X
Large typeface	X	X	X	X	X
Photographs	X	X	X		
Drawings	X	X	X	X	X
Colour				X	X
Black and White	X	X	X		
Cartoons	X		X		X
Step-by-step instructions	X	X	X		X
Stories about people and events	X	X			
Local content	X	X			
Conventional farming	X		X		X
Organic farming	X	X	X		X
Ecological landuse		X	X	X	X
IsiZulu	X	X			
English	X	X	X	X	X
Readability (simple sentence and word construction)	X	X	X	X	X
Very few words				X	
Few words					X
Many words	X	X	X		

information processes, as described by Karlsson (1994), were produced by one of the intermediaries and distributed to two of the participating farmer groups.

Participating farmers received printed materials irregularly from intermediaries and only occasionally accessed independent agricultural publications from seedling suppliers, and seed and chemical companies in nearby towns. Almost no printed agricultural materials of a general nature were reportedly available locally.

A minority of farmers confirmed Carter’s (1999, 66) findings that printed materials on their own could play an important role in exposing farmers to new information. A farmer from Tugela Ferry related how she experimented with information in a newsletter given to her by an NGO. This farmer read instructions on how to use herbs to make an insect repellent. She had not seen anyone do this before. She followed the instructions and her experiment worked. The same farmer reported successfully growing onions together with garlic using compost, whereas previously her onions would rot when she used chemical fertilisers. She carried out these experiments on her

own initiative, without prompting from the intermediary. These examples demonstrate two important factors: the value of intermediaries passing on printed information to farmers, and that some farmers experiment with information independently gleaned from printed materials to solve their problems.

Burton (2002, 51) argues that most people in underdeveloped communities do not know what information they lack nor do they know that information is available to help them solve their problems. This was borne out by comments made by two farmers who reported that they did not use printed agricultural materials because they “... do not need to read about something in books that we already know”, thus indicating that they were not aware that printed agricultural materials might provide them with new information. When the five PAIMS were introduced during the workshops, farmers were eager to get copies of some publications because they saw information in these materials that could assist them in their farming. As one farmer said excitedly: “I wish I had a book like this when I was younger. It can help a lot.”

Farmers' preferences for information channels

As with farmers in other parts of Africa (Carter 1999) and rural people in KwaZulu-Natal in general (Leach 2001a), the participants accessed agricultural information predominantly by verbal communication, such as through discussions with local people, intermediaries and chemical and seed suppliers. When farmers were asked where they obtained information on farming and where they went to obtain answers to specific problems, they first mentioned oral channels of information access. Only thereafter did farmers acknowledge other channels, such as printed and electronic media.

The farmers valued printed materials as a source of information, as found by Mbozi (2002) and Waters-Bayer (2002). One farmer reported that a visitor from Escourt read an agricultural newsletter at her home and then she requested copies for herself. Four farmers spoke of referring to and sharing printed materials that they had had in their possession for many years. In one instance, an Umbumbulu farmer had kept and still referred to a Government Gazette from 1956 that listed the growing seasons for various crops. Another Umbumbulu farmer used information from textbooks that he had kept from when he taught agriculture at school. A further example is of a farmer from Muden sharing with neighbouring farmers printed information on growing tomatoes. These findings show that when farmers accessed printed information materials that met their needs, they kept these materials – one could say 'treasured' them – to refer to whenever they needed.

The benefits of using printed information materials as stated by farmers is that they provide a permanent record and important aid to memory, confirming Leach's (2001a) and Carter's (1999) findings. One farmer said: "You can go back to read it again because you can forget what you are told." Another farmer said that printed materials could be passed on to children, "... even if you are dead." These comments confirm Meyer's (2002, 221) view that people may not accurately recall information shared verbally or may not disperse such information to those who were not within hearing of the verbal exchange.

Selection of an information source depends in part on the ease with which it can be accessed (Poole 1985, 87; Hewins 1990). It appears that the majority of farmers did not use printed informa-

tion, not only because of low levels of literacy (discussed in the next section) but also because of limited access to printed materials. The reasons for such inaccessibility seem to be a lack of finance to purchase materials, unavailability of suitable literature in their local villages, and failure on the part of intermediaries to pass on relevant, appropriately repackaged printed materials, especially material translated into local languages.

Electronic media mentioned by farmers were radio and television. However, both radio and televised agricultural programmes were regarded by many as being irrelevant as they contained information and recommendations suited to large-scale commercial farmers. Research was not carried out on farmers' access to and use of computers, the Internet and the World Wide Web, due to limited infrastructure in the areas where the study took place (with the exception of KwaMashu).

The effect of literacy and language on farmers' use of printed information

The study investigated participants' functional literacy levels, including visual literacy, in an attempt to determine whether they were able to read information in PAIMs.

Literacy and levels of education

Taking seven years of completed schooling as an indicator of functional literacy (Aitchison 2001, 135), 15 of the participants (32.6%) would be considered functionally literate, thus able to operate within a print dominated society. Thirty-one participating farmers (67.4%) would be considered functionally illiterate, more than double the national estimates of illiteracy among South African adults (28%) (Aitchison 2001, 135). Thirteen of the participants (28%) had no schooling, while the two farmers who had completed grade 12 also held tertiary qualifications.

Despite the majority of the farmers having had either no schooling or only some primary schooling, each of the four groups had at least one member who would be regarded as functionally literate (who had entered high school), with one group having had six functionally literate members who participated in the research. This finding relates to Carter's (1999, 2) findings that groups need just one literate member (or sympathetic non-member) for useful information and new

ideas in printed materials to be shared within the group. As one farmer commented: "You can get someone from the group to help you read them [the measurements]."

Many illiterate farmers interviewed mentioned that their children read isiZulu texts to them. Farmers also mentioned that relatives and other farmers assist with reading printed materials. These findings indicate the important role that family literacy plays in rural areas. One farmer described how she called farmers together to share information from an agricultural newsletter, confirming that literate farmers pass on information, accessed through printed materials, to other farmers.

Visual literacy

While visual literacy among the participants was not systematically measured, an attempt was made to gain insight into how farmers interpret and relate to pictures. The findings are based on farmers' comments after perusal of PAIMs introduced in the workshop.

The participants found the inclusion of pictures in the PAIMs beneficial, encapsulated in the comments: "Pictures are good"; "It is easy to understand the pictures"; and "When I see the picture, I become interested in the story and read about it." Most farmers indicated that if the pictures were realistic and descriptive enough, the inclusion of many words was unnecessary. However, participants expressed a desire to have sufficient text to be able to fully understand what the pictures were trying to convey. Where pictures had no accompanying explanatory text, farmers found messages lacked clarity. As one farmer said: "The pictures on their own are not enough to understand." Another farmer said: "It [the picture] is helpful, but needs more writing to fully understand." Therefore, it seems that a combination of pictures and text is best to help readers understand instructional visual materials (Morris & Stillwell 2003, 46). This view was borne out in a lively interaction by participants from Tugela Ferry who identified what they thought was a worm on the poster introduced during the workshop. Through discussion with the researcher the farmers realised that this was an outlet pipe from a dam to a river, rather than a worm. This example emphasises that pictures, and textless pictures particularly, are open to various interpretations based on people's environment, experience and

past exposure to two-dimensional images (that depict three-dimensional concepts) (Aboyade 1984, 243; Basel 1995). Because of this, pictorial images need to be pre-tested with target groups to overcome comprehension barriers (Hoffman 2000, 297). The farmers also reported their preference for step-by-step instructional picture stories, which concurs with Hoffman's (2000) view that series of pictures are more effective than single, short and simple messages.

Language preferences

Over 75% of farmers indicated that they were able to speak, read and write in their first language, isiZulu, while 25% said they could read and write English and almost 40% could speak English. It is therefore understandable that farmers prefer to read articles in the vernacular. The following comments show that farmers found printed materials in their home language preferable to those published in English: "I can understand it because it is written in isiZulu"; "If the book is in isiZulu, I could read it myself"; and "It [the book] would be better in isiZulu." Further evidence of this preference was the comments: "English is difficult to read" and "I like reading stories in isiZulu." These statements reinforce findings by Carter (1999) that rural people in Africa prefer printed materials written in local languages.

Comparing these facts with the finding that 28% of the farmers had not attended school, it is clear that levels of schooling and farmers' perceptions of what constitutes reading and writing are not enough to determine their actual literacy. This highlights the need for in-depth research and literacy testing to obtain more accurate results of literacy levels among resource poor, small-scale farmers.

Evaluation of printed agricultural information materials

To determine farmers' design and content preferences, farmers evaluated five PAIMs. The materials evaluated were:

- a newspaper (*Learn with Echo*, insert in *The Witness*);
- a newsletter (*Vikela*);
- two books (*People's Workbook and Peoples' Farming Workbook*);
- a poster (*Landcare*); and
- a step-by-step manual (*Infotoons*).

These materials were chosen because they partially comply with the guidelines for PAIMs recommended by Morris and Stilwell (2003). Table 3 lists key characteristics of the printed information materials that were evaluated by farmers. Of the four groups, two had received the newsletter from an NGO with whom they worked. None of the other four printed information materials had reached the participants, in spite of three of these publications (step-by-step manual, newspaper and poster) being available free of charge in the province.

Once the farmers had perused and discussed each of the five examples in turn, they ranked their first, second and third choices. The majority of the farmers ranked the newsletter as their first choice of printed material because it contained stories about the successes and activities of farmers, was available in isiZulu and English, the print size was large, the font was easy to read, and the publication had many pictures and illustrations. The second most popular choice was the step-by-step instruction manual that was written in simple English, with many illustrations and information on a range of agricultural, storage and processing topics. A number of farmers remarked that this publication was easy to follow as it showed how things were done.

The farmers' third choice was the two books that contained information on many aspects of farming and rural life. Some farmers said that the books contained too much information, suggesting language and content barriers to access and comprehension of the information in the books. The two farmers who had tertiary education and a number of the more literate farmers preferred books with plenty of information on different topics, rather than separate pamphlets or leaflets that they said could easily be lost.

Participants found the newspaper easy to read because much of the isiZulu text was in large font. They also reported that explanations of the various topics covered were good. Farmers took some time to accurately decipher the poster that depicted two illustrations of the same location (one degraded and one rehabilitated). At first, farmers focused on individual aspects of each of the pictures and only later compared the two pictures before reaching consensus that one picture showed a 'protected' area and the other showed an 'unprotected' area. Farmers suggested that the poster needed more explanation to be clearly understood.

The provision of printed materials for potential small-scale commercial organic production

The participants reported that they had received very little printed information on organic farming. Some farmers had attended training courses in organic production methods and organic certification controls, and visited markets and other farmers to learn about alternative marketing opportunities. An internal inspector from the Umbumbulu group responsible for ensuring that the group met organic standards received printed notes during an organic certification-training workshop that she attended. She stated that she had never referred to these notes because they were written in English and were too difficult to read. Printed materials in English provided by training courses in organic farming methods did not meet the design guidelines for semi-literate readers, as set out by Morris (2001).

Farmers' information needs

Farmers commented that they specifically wanted printed information on:

- types of produce that sell well to organic markets;
- instructions for soil fertility tests that farmers can do themselves;
- organic pesticides and insecticides to deal with ants, cutworm and moles;
- farming without chemical fertilizers;
- available markets for organic produce;
- sources of funding for inputs; and
- bookkeeping and financial management.

The above list suggests a critical need for accurate, up-to-date printed information on organic farming, certification processes, and markets. While some printed materials on organic production and marketing were available, these materials were inappropriately packaged for small-scale farmers and/or not available locally. Most information on organic production and marketing was contained within general agricultural publications.

Information use and information channel use

A number of Poole's (1985) propositions apply to the participating small-scale farmers' access, preferences and use of agricultural information,

Table 4. Summary of results in relation to various information use propositions (after Poole 1985)

Results	Propositions Information use is a function of:		Information channel use is a function of:				
	Need	User awareness	Accessibility	Credibility	Need	User awareness	Channel noise
Farmers requested inter- mediaries to assist them			X	X	X	X	
Farmers do not know what information they need						X	
Farmers have little access to printed materials			X			X	
Oral forms of information access predominate			X	X		X	
Farmers do not access agri- cultural information via electronic media			X			X	
Printed materials provide a permanent record	X	X		X	X		
Application of innovative in- formation accessed via printed materials	X	X		X	X	X	
Preference for printed materials in own vernacular							X
Preference for a combination of pictures and text							X

including printed materials. Table 4 depicts a summary of the results in relation to various information use propositions.

Inspection of Table 4 reveals that the most common factor affecting small-scale farmers' use of an agricultural information channel was their awareness of the channel or lack thereof but accessibility and credibility also influenced participating farmers' use of an information channel.

Conclusions and recommendations

Printed agricultural information materials have a definite and valuable role in providing information on commercial organic farming, and can complement traditional, predominantly oral, ways of exchanging information in rural areas. Farmers can access information in printed materials, either through their own reading or in the case of illiterate or semi-literate farmers, through the assistance of a functionally literate member within their farmer group, or through family members and neighbours.

Intermediaries, whom farmers trust and rely on for external information, could play a vital

role in exposing farmers to alternative information channels and/or sources. In an attempt to meet farmers' new information needs, it is recommended that intermediaries produce printed materials based on farmers' preferences and preferably in conjunction with farmers (Lupele 2003). Since farmers readily refer to each other for advice, the provision of appropriately repackaged and relevant PAIMs is likely to facilitate the transfer of information among farmers.

Small-scale farmers lack a permanent record of the complex and growing body of knowledge and information required to operate within the emerging organic industry. There is a critical need for appropriately repackaged PAIMs to reach them. However, while printed materials may guide small-scale farmers in making decisions, this study has shown that, on their own, printed materials are not sufficient to meet small-scale farmers' new information needs. PAIMs were found to be just one aspect of the participants' knowledge and information landscape.

This study has highlighted the need for in-depth investigation into resource-poor, small-scale organic farmers' agricultural knowledge and

information systems (AKIS). Understanding who the holders of knowledge and information are, the nature of such knowledge, and the links and flows between these holders of knowledge, may facilitate synergic linkage of the necessary external information with farmers' indigenous and local knowledge, to promote commercial organic production. It is recommended that a collaborative, action research approach be adopted to ensure that farmers jointly investigate, and can make improvements to, their AKIS.

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