

Key points

- ✓ Intensification strategies based on external inputs rarely deliver higher incomes or improved food security for poor farmers, especially women.
- ✓ Decision makers frequently overestimate the benefits of pesticide use and overlook the economic, health and environmental costs.
- ✓ Increased food production and farm family welfare has been achieved using sustainable pest, soil and water management methods.

enough food to store through the lean season. In Cuba, the urgent need to develop alternatives to agrochemical reliance after the demise of Soviet supplies has led to top-level policy commitment to organic agriculture for the entire country, with urban farms and gardens providing the principle source of fresh produce to the cities.

Conclusions

It is time donors and policy makers recognised that intensification strategies based on high levels of external inputs often cause more problems than they aim to solve for smallholders. This approach rarely addresses rural households' constraints on achieving food security. It is commonly believed that modern technologies alone can feed the hungry. However there is strong evidence that sustainable intensification strategies drawing on traditional knowledge, ecologically-based pest, soil and water management methods and appropriate crops and varieties are equally productive. Resources and policy commitment should facilitate these approaches, while supporting storage and marketing strategies to enhance the food provision and income generation capacity of poor farmers.

Resources

Reducing Food Poverty with Sustainable Agriculture: a summary of new evidence. Final report from the SAFE-World research project, J Pretty and R Hine, Centre for Environment & Society, University of Essex, 2001. www2.essex.ac.uk/ces/ResearchProgrammes/CESOccasionalPapers/SAFErepSUBHEADS.htm

FAO Community IPM website includes training materials, case studies and scientific papers on IPM and soil management techniques and experiences in Asia. www.communityipm.org/

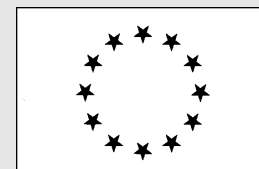
The Potential of Agroecology to Combat Hunger in the Developing World, M Altieri, P Rosset and LA Thrupp, and other documents and videos available at the Agroecology in Action website <http://www.cnr.berkeley.edu/~agroeco3/>

Regenerating Agriculture. Policies and Practice for Sustainability and Self-reliance, J Pretty, Earthscan, London, 1995

Pesticides, Poverty & Food Security, report on case studies of pesticide dependence among African smallholders, PAN UK.

PEST MANAGEMENT NOTES No.14

Agriculture for food security



A briefing for the IPM in Developing Countries Project funded by the European Commission (Environment in Developing Countries budget).

This briefing explores agricultural production strategies for smallholder farmers and the impacts on their food security, welfare and livelihoods. It highlights a case study from Ethiopia.

Food security and production strategies

Over 800 million people in the world go hungry each year. The World Food Summit Five Years Later held in June 2002 announced an international Alliance Against Hunger to renew commitments to halve this number by 2015. Poverty alleviation and sustained agricultural production are key strategies. Since the vast majority of the hungry and those living in poverty are in rural areas and dependent on agricultural or natural resources for their livelihoods, attention has focused on how to

improve subsistence farming systems, especially in sub-Saharan Africa. The strategies promoted by the World Bank, many governments and donors, to increase productivity frequently rely on providing access to fertilisers, improved seeds and agrochemical inputs. These strategies assume that if smallholders can be encouraged to use more external inputs and modern cropping practices, then yields and therefore income will dramatically increase.

One country where intensification of smallholder agriculture for food security has been most enthusiastically promoted is Ethiopia. One of the poorest countries in Africa, Ethiopia is afflicted by repeated droughts and malnutrition among children under five reached 47% in 2000. The Sasakawa Global 2000 programme has been active since 1993



Ethiopian farmer and his son mix toxic pesticides with no protection. Photo: Safe Environment Group.

to transform subsistence farming by supplying technology packages for maize, wheat, teff, sorghum and barley. These packages include improved varieties of seed (higher yielding and/or early maturing) which require the application of fertiliser to produce good yields. The government's extension service promotes the technology packages using demonstration plots. The service provides access to credit as most Ethiopian farmers cannot afford to buy these inputs up-front, especially since government subsidies on fertilisers were removed.

Farmers' experiences with intensification

What has been farmers' experience in adopting intensive methods? Have they improved their income and food security? A case study carried out in 2001 looked at these questions with farmers from three villages in the medium-potential zone of Bahir Dar in Amhara Region, where farmers grow a range of cereal and legume crops for household consumption and for sale. The study found mixed results: increased production but frequently offset by increased spending on pesticides and higher losses from pest attacks in storage. The ready availability of toxic products in areas where the conditions militate against use of essential safeguards has led to increased poisonings, ill-health, soil degradation and adverse effects on biodiversity - including loss of pollinators.

Ethiopian experience of intensification

The main change in farming systems in Ethiopia has been the introduction of improved varieties of maize. Since 1996 maize has become the motor of the local economy, often at the expense of certain traditional crops. The better-off farmers have started to grow vegetables, chat and eucalyptus which are more lucrative than traditional staples.



Agriculture for food security, PMN N° 14, July 2002. This briefing is one of a series prepared by Pesticide Action Network UK (PAN UK), which is responsible for its contents, as consultants to DG Development of the EC. PAN UK is an independent charity working to reduce pesticide problems in developing countries. Its quarterly journal Pesticides News reports on pesticides and IPM.

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“Improved maize varieties are highly susceptible to weevils. The cost of insecticide applications for village granaries has risen, and is now reducing or cancelling the gains from increased yields.”

Pesticide trends and improved varieties

Ten years ago farmers in Bahir Dar used little pesticide, possibly one application a season, and harvested a range of crops without major losses. Now they apply a range of pesticides three to four times a season. Despite this, there are significant increases in pest infestation levels, a

worsening of weed problems, and new insect pests and weeds. Farmers attribute this to the ineffectiveness of certain products and the susceptibility to pests of improved varieties compared to local varieties. Improved maize is particularly susceptible to attack by weevils in storage and will not last a month without treatment. Insecticide application on stored maize has become the norm: without this farmers' experience is that net losses reduce or cancel out any yield benefits. Most granaries in the villages now have chronic weevil infestations.

Neither Sasakawa Global 2000 nor the extension service make a significant effort to inform farmers of the pest management implications of using the susceptible improved varieties, and the technology package does not include components to help farmers manage grain storage pests. Crop protection specialists criticise the extension programme for its over-emphasis on boosting yields, without adequate attention to pest control. Farmers are left to tackle pest problems by themselves and many rely on unlicensed pesticide traders, who often supply poor quality and adulterated products.

Health and environmental impacts

Increased use of pesticides carries serious consequences for farm family health and the productivity of agro-ecosystems. Farmers take no precautionary measures and do not understand the hazards of applying pesticides. Misuse for treating human parasites and open wounds was reported, and has led to some fatalities. These incidents demonstrate the failure of any precautionary messages that accompany extension activities. An increase in suicides using pesticides, particularly by women and teenage girls, is worrying communities.

Livestock and wild animal poisonings were reported in each village, mainly from pesticide-baited food intended to kill rats or direct application to kill animal parasites. One farmer killed four oxen by accident, representing a huge loss to his income and productivity, since draught animals are valuable assets. Farmers have observed frequent bee kills after spraying

grasspea crops, a favourite nectar source. Honey yields have declined by 30% in recent years, losing an important source of income, and farmers attribute this to pesticide poisoning, combined with loss of forest habitat.

Food safety and food production

Maize yields have certainly increased massively with improved varieties and application of synthetic fertiliser but this has not translated into higher farm productivity for most poor and medium wealth households. Farmers say the continuous cultivation of maize without fallowing or crop rotation has depleted soil nutrients. Yields of their cereal and legume crops have declined dramatically, even with fertiliser use. Increased pest and weed problems have forced farmers to abandon certain crops, and a new caterpillar pest has appeared in maize cobs.

Many farmers use unapproved pesticides, particularly malathion and DDT, for treating the improved varieties of stored maize. Families often eat unwashed grain shortly after treatment. High pesticide residue levels may result in maize, vegetables and chat and farmers suspect that increased incidence of gastric and respiratory illness could be due to residues, particularly in maize used to brew local beer. Health professionals in the district confirmed this trend and are concerned about residue levels too.

Vulnerability linked to high external inputs

Farmers associate their shift to high chemical input strategies since 1995 with much higher production costs and risks. The higher yields from improved varieties, and two good years of rainfall, produced surpluses that led to a dramatic drop of 25-45% in cereal prices. Unfortunately, the intensification strategy did not consider marketing or economic aspects in the quest to raise yields. Farmers who had taken loans to purchase the more expensive improved seeds and agrochemical inputs found themselves with huge debts. Under heavy pressure to repay debts, some have been forced to sell off valuable livestock.

The price crashes hit farmers hard as they had grown highly dependent on cash income for family food provision, selling over 50% of their crops. Poor farmers average only eight months' cereal supplies in a good year. They have decreased their food reserves and can no longer give food to needy relatives. Farmers are disillusioned with high input strategies, which make their livelihoods dependent on factors beyond their control. Agrochemical input prices have risen sharply and farmers predicted that with current levels of indebtedness, many will not be able to afford fertilisers in the 2002 season. They anticipate poor yields. Some farmers have abandoned improved maize and are concentrating on finger millet which resists storage pest attack.

Common problems with intensification

PAN UK case studies from Ghana, Senegal and Benin confirm the findings from Ethiopia that intensification strategies based on high external inputs do not generally improve food provision or income generation for poor farmers. Improved cowpea varieties introduced in Ghana, for example, are much more prone to insect attack in the field and storage than local varieties. Poorer farmers, especially women, have not adopted them because they lack the cash to buy insecticides. Other farmers mainly use highly toxic insecticides, such as endosulfan, which are illegally diverted from the cotton sector and have provoked food poisoning cases when used on stored cowpea.

Aggressive promotion of crops and varieties which rely heavily on external inputs does nothing to address problems of poor farmers, such as land fragmentation, lack of investment capital, inadequate or unfavourable marketing channels or declining soil fertility. Across Africa, input prices have risen more steeply than farmgate prices. This undermines income, and therefore food security, for millions of farmers growing staple food, cotton, vegetables or other market crops.

Pesticide dependence

Key findings from case studies with over 400 smallholder women and men growing cotton, vegetables, pineapple and cereals:



Members of the Debeko Farmer Field School discuss pest observation methods in their teff fields. Photo: Save the Children (UK).

- | Pesticide use is increasing despite higher prices
- | Agricultural intensification strategies promote pesticide reliance
- | Pesticide promotion deepens inequality
- | Illicit pesticide trade increases with liberalisation
- | Pesticides undermine the productivity of agroecosystems
- | Food safety is decreasing
- | Pesticides mean extra health costs
- | Pesticides are linked to rising indebtedness
- | Food provision and food security is declining
- | Smallholder access to changing export markets is more uncertain

Farmers linked their vulnerability to pesticides, which now account for a large proportion of production cash expenses (an estimated 54% for poor farmers in one village). Yet the products they purchase are often ineffective. Farmers cannot always obtain pesticides or access spray equipment at the right time. Poor farmers cannot afford to grow lucrative crops like vegetables which require high levels of pesticides. Extension services do not promote safer, low-cost methods of pest and soil management.

Challenging assumptions

Many decision makers assume that there will be substantial benefits from increasing the use of pesticides in smallholder agriculture, but fail to consider, much less quantify, the direct purchase costs or the indirect costs these often entail in poisonings, and the impacts on livestock and agroecosystems. They tend to presume that absence of external synthetic inputs results in low yields and are often unaware of the potential of alternative production methods to increase productivity.

“Farmers linked vulnerability to the cost of purchasing pesticides. This accounts for a large proportion of expenditure, but the products are frequently ineffective.”

Experiences of farmers in many different cropping systems reveal that intensive crop production without complete reliance on pesticides and synthetic fertilisers is

perfectly feasible when combined with practices which regenerate agrobiodiversity or make better use of local natural resources. The SAFE-World project conducted the largest known survey of worldwide sustainable agriculture and records that over eight million farmers have adopted sustainable practices and technologies. These include integrated pest management (IPM), legume cover cropping, water harvesting, new but locally appropriate crop and livestock varieties, intensified micro-environments (fish ponds, vegetables on paddy bunds) or addition of new productive elements to a farm system (tree cropping). Household food production increased by an average of 73% for 4.4 million farmers cultivating less than five ha, while productivity increases for rain-fed crops were generally 50-100%.

In Ethiopia, one such project helped 12,500 households to improve yields by 60% and nutrition levels by 70% using organic manures, botanical methods of pest control and the introduction of vegetable and tree crops and veterinary services. Farmer Field School (FFS) IPM training pilot work in cereal crops has enabled farmers to cut back on synthetic pesticides and raise income and yields. IPM with Field School training has recently been adopted as the crop protection strategy of the Amhara Regional Board of Agriculture. The European Union is funding training.

In Ghana, FFS farmers in rice, vegetables and plantain increased their income by 70-135% and participants in food-insecure drylands produced