

A new paradigm of agriculture

SAVE AND GROW

A POLICYMAKER'S GUIDE
TO THE SUSTAINABLE INTENSIFICATION
OF SMALLHOLDER CROP PRODUCTION



Save and grow

*A policymaker's guide
to the sustainable
intensification
of smallholder crop
production*



Sustainable crop production intensification can be summed up in the words *save and grow*.

Sustainable intensification means a productive agriculture that conserves and enhances natural resources. It uses an ecosystem approach that draws on nature's contribution to crop growth and applies appropriate external inputs at the right time, in the right amount. Our aim over the next 15 years is to assist developing countries in adopting *save and grow* policies and approaches.



Jacques Diouf

Director-General

Food and Agriculture Organization
of the United Nations



Unsustainable consumption of natural resources presents a grave threat to food security.

This book shows how we can launch an 'evergreen' revolution, leading to increases in productivity in perpetuity, without ecological harm. I hope it will be widely read and used.



M. S. Swaminathan

Father of the Green Revolution in India

The challenge

***To feed a growing world population,
we have no option but to intensify crop production.
But farmers face unprecedented constraints.
In order to grow, agriculture must learn to save.***

The Green Revolution led to a quantum leap in food production and bolstered world food security. In many countries, however, intensive crop production

has depleted agriculture's natural resource base, jeopardizing future productivity. In order to meet projected demand over the next 40 years, farmers in the developing world must double food production, a challenge made even more daunting by the combined effects of climate change and growing competition for land, water and energy. This book presents a new paradigm: sustainable crop production intensification (SCPI), which produces more from the same area of land while conserving resources, reducing negative impacts on the environment and enhancing natural capital and the flow of ecosystem services. While none of the options presented is etched in stone, all are based on sound scientific principles and have helped farmers around the world to "save and grow".

Crops and varieties

***Farmers will need a genetically diverse portfolio
of improved crop varieties that are suited to
a range of agro-ecosystems and farming practices,
and resilient to climate change.***

Genetically improved cereal varieties accounted for some 50 percent of the increase in yields over the past few decades.

Plant breeders must

achieve similar results in the future. However, timely delivery to farmers of high-yielding varieties requires big improvements in the system that connects plant germplasm collections, plant breeding and seed delivery. Over the past century, about 75 percent of plant genetic resources has been lost and a third of today's diversity could disappear by 2050. Increased support to germplasm collection, conservation and utilization is crucial. Funding is also needed to revitalize public plant breeding programmes. Policies should help to link formal and farmer-saved seed systems, and foster the emergence of local seed enterprises.

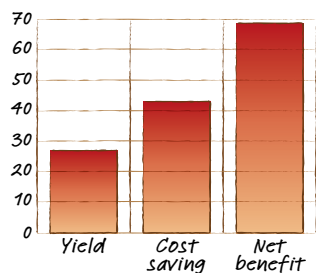


Farming systems

Crop production intensification will be built on farming systems that offer a range of productivity, socio-economic and environmental benefits to producers and to society at large.

Farmers can grow more and save natural resources, time and money with conservation agriculture (CA), which minimizes tillage,

Financial advantage of zero tillage over conventional tillage in Haryana, India (US\$/ha)



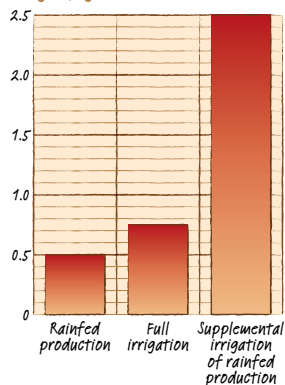
protects the soil surface, and sows crops in rotations that enrich the soil. It helps reduce water needs by 30 percent and energy costs by up to 60 percent. Trials in southern Africa saw a six-fold increase in maize yields. CA practices are a key component of sustainable intensification, which also requires using good seed of high-yielding adapted varieties, integrated pest management, plant nutrition based on healthy soils, efficient water management, and the integration of crops, pastures, trees and livestock. Such systems are knowledge-intensive. Policies for SCPI should build capacity through extension approaches such as farmer field schools, and facilitate local production of specialized farm tools.

Water management

Sustainable intensification requires smarter, precision technologies for irrigation and farming practices that use ecosystem approaches to conserve water.

Cities and industries are competing intensely with agriculture for the use of water. Despite its high productivity, irrigation is under growing pressure

Productivity of water in wheat production (kg of grain/m³)



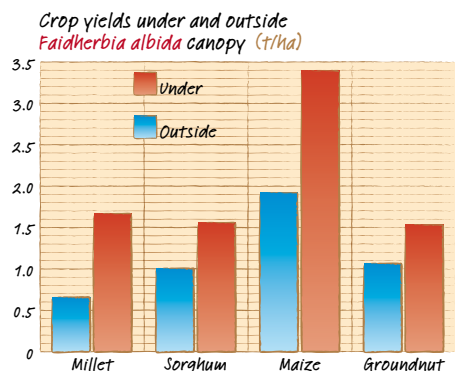
to reduce its environmental impact, including soil salinization and nitrate contamination of aquifers. Knowledge-based precision irrigation that provides reliable and flexible water application, along with deficit irrigation and wastewater-reuse, will be a major platform for sustainable intensification. Policies will need to eliminate perverse subsidies that encourage farmers to waste water. In rainfed areas, climate change threatens millions of small farms. Increasing rainfed productivity will depend on the use of improved, drought tolerant varieties and management practices that save water.

Soil health

Agriculture must, literally, return to its roots by rediscovering the importance of healthy soil, drawing on natural sources of plant nutrition, and using mineral fertilizer wisely.

Soils rich in biota and organic matter are the foundation of increased crop productivity. The best yields are achieved when nutrients come

from a mix of mineral fertilizers and natural sources, such as manure and nitrogen-fixing crops and trees. Judicious use of mineral fertilizers saves money and ensures that nutrients reach the plant and do not pollute air, soil and waterways. Policies to promote soil health should encourage conservation agriculture and mixed crop-livestock and agro-forestry systems that enhance soil fertility. They should remove incentives that encourage mechanical tillage and the wasteful use of fertilizers, and transfer to farmers precision approaches such as urea deep placement and site-specific nutrient management.



Plant protection

Pesticides kill pests, but also pests' natural enemies, and their overuse can harm farmers, consumers and the environment. The first line of defence is a healthy agro-ecosystem.

In well managed farming systems, crop losses to insects can often be kept to an acceptable minimum by deploying resistant varieties, conserving



predators and managing crop nutrient levels to reduce insect reproduction. Recommended measures against diseases include use of clean planting material, crop rotations to suppress pathogens, and eliminating infected host plants. Effective weed management entails timely manual weeding, minimized tillage and the use of surface residues. When necessary, lower risk synthetic pesticides should be used for targeted control, in the right quantity and at the right time. Integrated pest management can be promoted through farmer field schools, local production of biocontrol agents, strict pesticide regulations, and removal of pesticide subsidies.

Policies and institutions

To encourage smallholders to adopt sustainable crop production intensification, fundamental changes are needed in agricultural development policies and institutions.

First, farming needs to be profitable: smallholders must be able to afford inputs and be sure of earning a reasonable price for their crops. Some

countries protect income by fixing minimum prices for commodities; others are exploring “smart subsidies” on inputs, targeted to low-income producers. Policymakers also need to devise incentives for small-scale farmers to use natural resources wisely – for example, through payments for environmental services – and reduce the transaction costs of access to credit, which is urgently needed for investment. In many countries, regulations are needed to protect farmers from unscrupulous dealers selling bogus seed and other inputs.

Major investment will be needed to rebuild research and technology transfer capacity in developing countries in order to provide farmers with appropriate technologies and to enhance their skills through farmer field schools.

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Lead authors

Linda Collette, Toby Hodgkin,
Amir Kassam, Peter Kenmore, Leslie Lipper,
Christian Nolte, Kostas Stamoulis,
Pasquale Steduto

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Contacts

Further information: agp@fao.org
Media relations: FAO-Newsroom@fao.org
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