

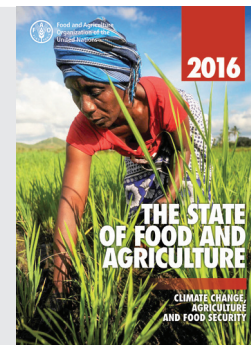


# The State of Food and Agriculture 2016

## Climate change, agriculture and food security

### IMPROVED FARMING PRACTICES REDUCE IMPACTS OF CLIMATE CHANGE - BUT BARRIERS TO THEIR ADOPTION REMAIN

The broad adoption of improved farming practices can substantially reduce the number of people at risk of undernourishment; for example, the adoption of nitrogen-efficient crop varieties alone can reduce the risk to more than 120 million people. However, adoption of improved practices remains very low, even in areas where projects have heavily promoted them. Positive change will only come about when barriers to adoption – financial, institutional and policy constraints – are better understood and removed.



### The time for action is now

In many regions of the world, climate change is having a negative impact on the production and productivity of crops, livestock, fisheries, and forestry. Depending on location, the causes can be rising temperatures, increased temperature variability, a greater frequency of dry spells and droughts, and increasing intensity of floods. Beyond 2030, the negative impacts will become increasingly severe in all regions. Productivity declines, and the food price increases that accompany them, have serious implications for food security. Moreover, the areas most affected will be those with already high rates of hunger and poverty.

With climate change, the population living in poverty could increase by between 35 and 122 million by 2030 relative to a future without climate change, largely due to its negative impacts on incomes in the agricultural sector.

### Responding to climate change: sustainable agricultural practices

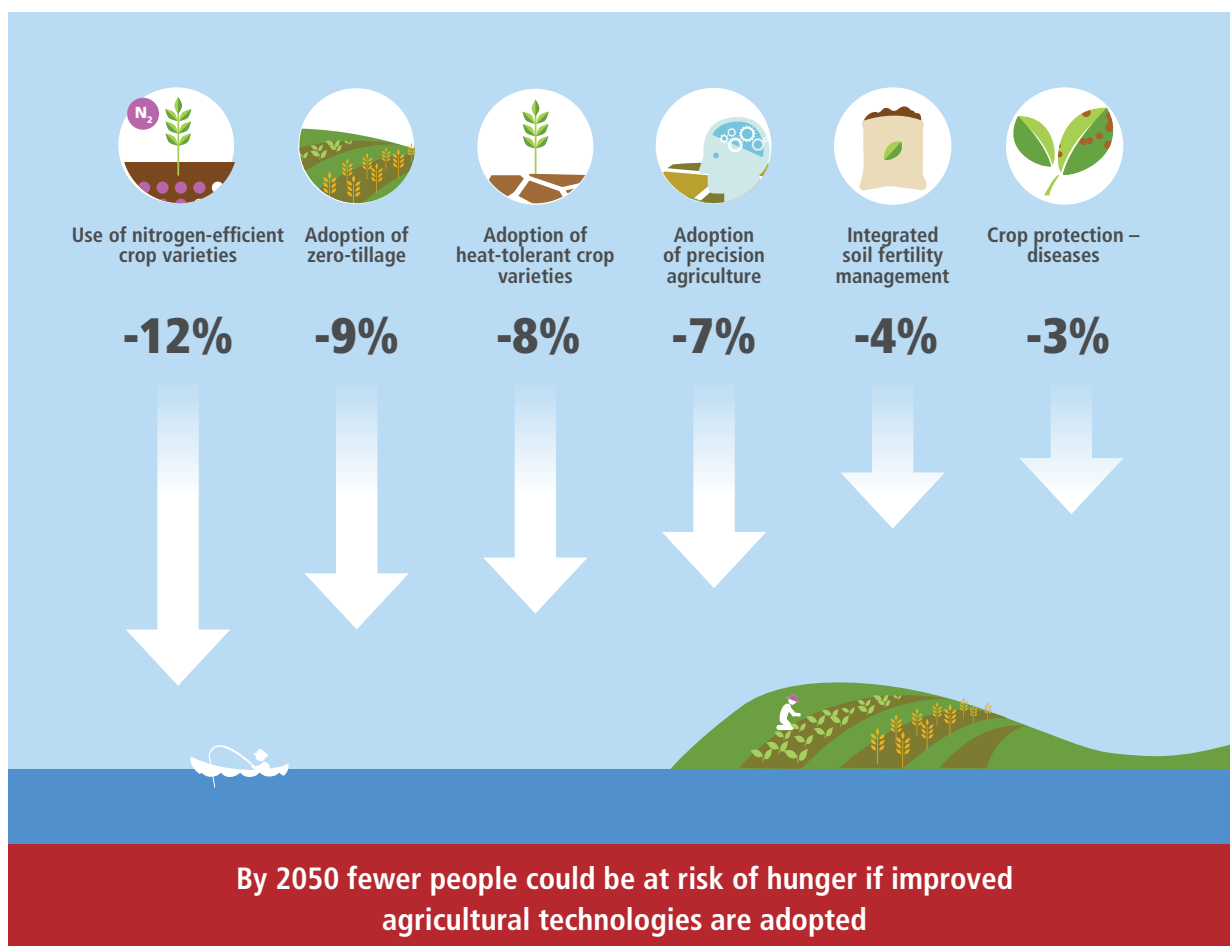


Unless action is taken now to make agriculture more sustainable, productive and resilient, the impacts of climate change will seriously compromise food production in regions that are already highly food-insecure. Delaying the transformation of the agriculture sector will force poorer countries to fight poverty, hunger and more severe climate change at the same time.

## Sustainable agricultural practices are part of the solution

Introducing sustainable agricultural practices can bring about significant improvements in food security, as well as resilience to climate change. The wide adoption of practices such as the use of nitrogen-efficient and heat-tolerant crop varieties, zero-tillage and integrated soil fertility management would boost productivity and farmers' incomes, and help lower food prices. By one estimate, the number of people at risk of undernourishment in developing countries in 2050 could be reduced by more than 120 million through widespread use of nitrogen-efficient crop varieties alone, by 90 million people if zero-tillage were more widely adopted, and by 80 million people if heat-tolerant crop varieties or precision agriculture were adopted.

**FIGURE 1** Scenario for 2050: the number of people at risk of hunger, relative to the baseline scenario\* after adoption of improved agricultural technologies



\*Note: The baseline scenario used for these estimations projects a total of about 1 billion undernourished people by 2050, meaning that an impact of 12 percent would amount to a reduction in the number of people at risk of hunger of approximately 120 million.

Source: FAO, 2016, Fig. 15, p. 55.

The benefits of some of the above practices are not limited to reducing hunger but also include greenhouse gas mitigation. For example, no-till agriculture can also reduce losses of soil organic carbon, while nitrogen-efficient varieties can reduce emissions associated with fertilizer inputs.

## Factors that hinder the adoption of sustainable farming practices

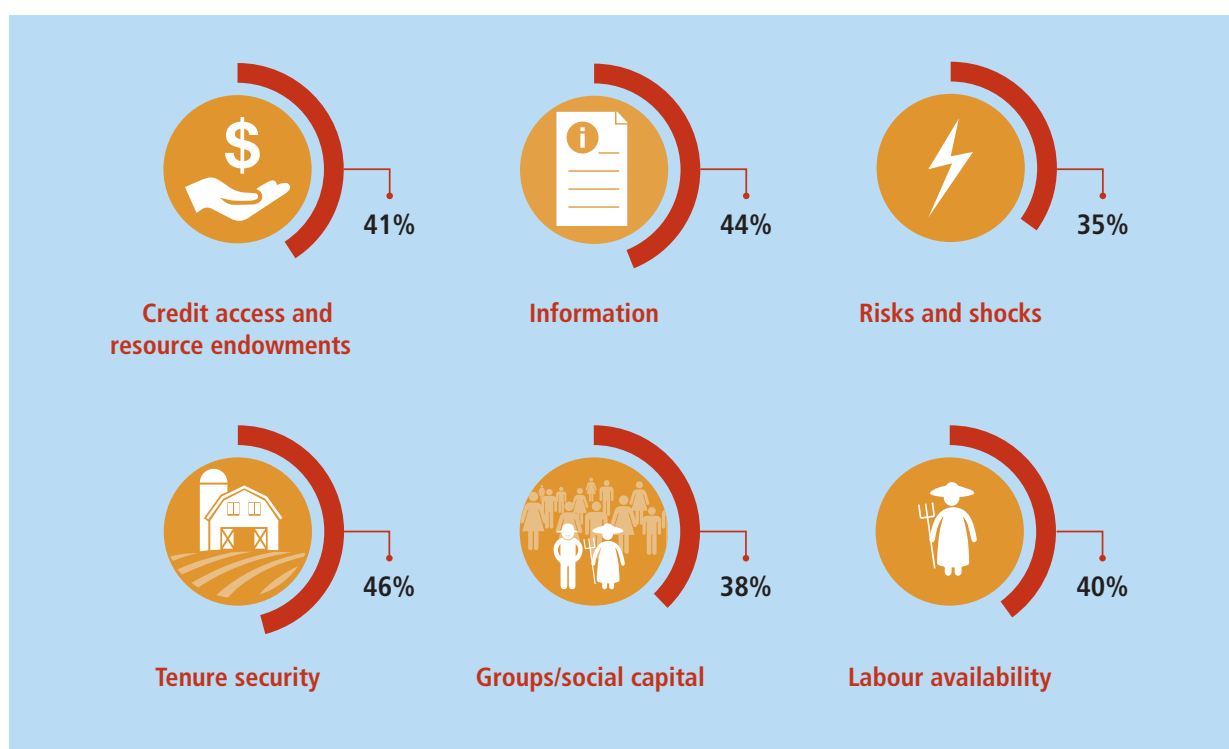
Institutional arrangements that support increased and stabilized returns from agricultural production are essential. Agricultural input and output markets play a central role, but other institutions – such as rural credit and insurance programmes, agricultural extension, land and water tenure arrangements – have all been found to play important roles in supporting, or hindering, smallholders in the transition to systems with higher resilience.

Adoption of sustainable practices can also be hampered by the existing policy environment. For example, policies, such as input subsidies, may perpetuate unsustainable production practices rather than those that promote resource-use efficiency and the reduction in the intensity of agriculture's own greenhouse gas emissions.

Smallholders in particular face a broad range of barriers on the path to sustainable agriculture, such as limited access to markets, credit, extension advice, weather information, risk management tools and social protection. Women, who make up around 43 percent of the agricultural labour force in developing countries, are especially disadvantaged, with fewer endowments and entitlements than men, even more limited access to information and services, gender-determined household responsibilities, and increasingly heavy agricultural workloads owing to male out-migration.

A recent meta-analysis was conducted of the determinants of and barriers to adopting improved technology in Africa (Figure 2). The analysis was built on information from some 150 published papers and includes 87 improved practices in agroforestry, agronomy and livestock production.

**FIGURE 2** What does the scientific literature have to say on why farmers do or do not adopt improved technologies and practices?



Note: The percentages indicate the share of studies in which the cited factor is statistically significant as a determinant of adoption of improved agronomic or agroforestry practices.

Source: FAO, 2016, Box 14, p. 64.

All of the barriers listed in Figure 2 are significant in at least one third of the studies, indicating that none of them can be ignored when trying to address barriers to adoption. The analysis also indicated a need to specifically target those with lower endowments, especially women farmers and female-headed households, as they typically have much more limited access to information and technologies. In fact, it was found that female-headed farm households were far less likely to adopt improved agroforestry or agronomic practices.

## Policy responses

Sustainable management practices have great potential to reduce the number of food-insecure people under changing climatic conditions. However, the barriers to their adoption need to be addressed.

Identifying the barriers that farmers face in a specific context is a critical first step. Failure to do so can lead to investing scarce resources in projects that do not stimulate the sustained adoption of practices they are promoting. Addressing, in a targeted manner, issues such as access to credit, markets, and information, as well as improving tenure security and social capital, will therefore be part of the portfolio of policies needed to make agriculture more sustainable and improve resilience to climate change. The emphasis placed on the different elements will be context-dependent.

There will be situations where a reorientation of agricultural and rural development policies is needed that resets incentives and lowers the barriers to the transformation of food and agricultural systems. Particular attention should be given to supporting low-income smallholder farmers in strengthening their capacity to manage risks and adopt effective climate change adaptation strategies, since smallholder farmers do not have the same capacity as global agribusinesses to respond to policy and market signals, and overcome barriers to adoption.

### REFERENCE

FAO. 2016. *The State of Food and Agriculture 2016. Climate change, agriculture and food security*. Rome, FAO.

This is Info note number 2 of 3 drawn from *The State of Food and Agriculture 2016. Climate change, agriculture and food security*. For sources and more detail, please refer to the complete report (available at [www.fao.org/3/a-i6030e.pdf](http://www.fao.org/3/a-i6030e.pdf)). Info note 1 presents the main contents of the report and discusses the changes needed in agriculture in order to respond to the challenge of climate change. Info note 3 addresses the policies, institutions and financing needed to address climate change in agriculture.

### TO KNOW MORE

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