



Food Security in a Changing Climate

HOW DOES CLIMATE CHANGE IMPACT AGRICULTURE?

Climate change causes erratic weather patterns, extreme temperatures and changes in natural resources, threatening farmers' ability to sustainably produce and maintain quality crops.

EXCESSIVE HEAT

Reduces surface water and depletes aquifers
Disrupts flowering and pollination of crops
Increases weed, insect and disease pressures

LOSS OF NATURAL RESOURCES

Removes habitats and food for beneficial insects
Dries up water sources

DROUGHT

Causes crop failures and loss of arable land

EXCESSIVE PRECIPITATION

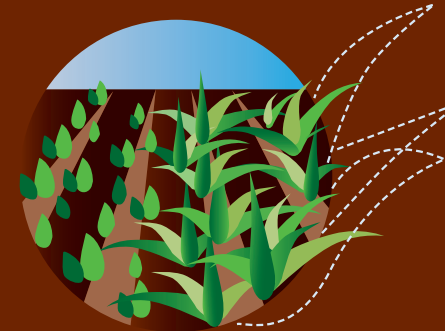
Increases difficulty of planting
Raises flood risk
Damages crops

NEW PESTS AND DISEASE PRESSURES

More competition for soil and water resources
Greater damage to crops

FLOODING

Removes topsoil
Drowns crops



HOWEVER, OUR WORLD'S CLIMATE IS CHANGING

rapidly and as droughts, floods and unpredictable weather become more common, it is becoming harder for farmers to grow our food.



TO MEET OUR NEEDS GROWERS WILL

need to produce more food—as much as **70% more than today**—while reducing farming's footprint.

70% MORE FOOD

WE NEED NEW AGRICULTURAL TECHNOLOGIES

that can help our farmers adapt, become more resilient and meet the growing challenges our world will hand to them in the decades ahead.

BY
2050



our world's population will surpass

9 BILLION

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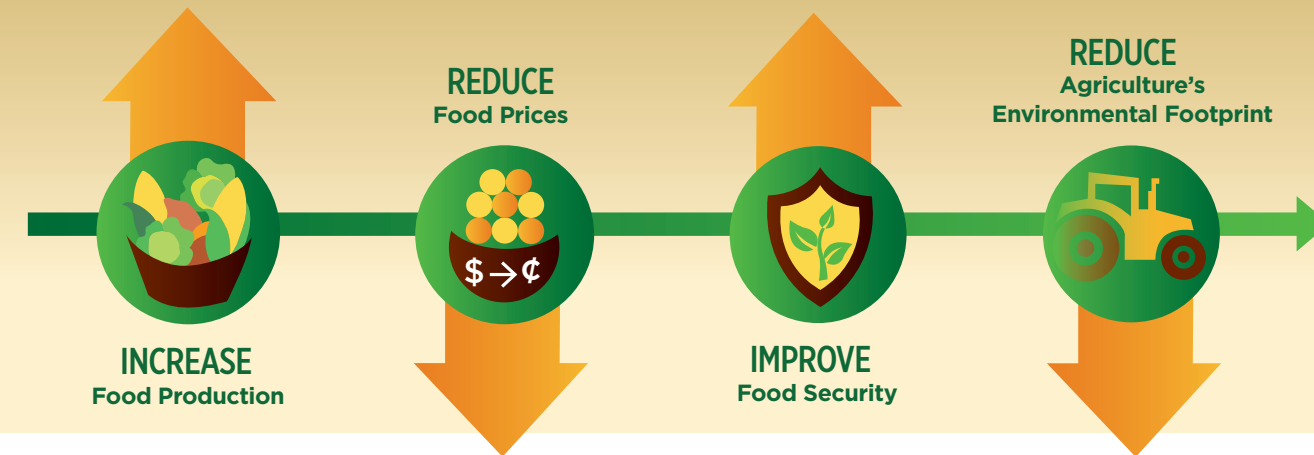
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HOW CAN FARMERS MITIGATE AND ADAPT TO CLIMATE CHANGE?

A full suite of crop protection and plant biotech products can help farmers:

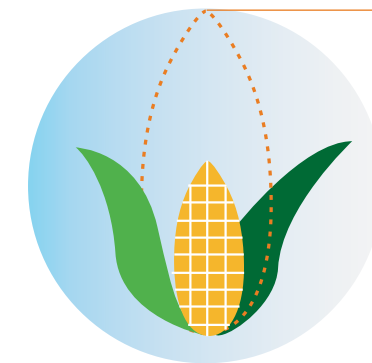


Farmers need access to the best mix of technologies to look after our planet, feed a growing population and progress their communities.

TODAY'S TECHNOLOGIES

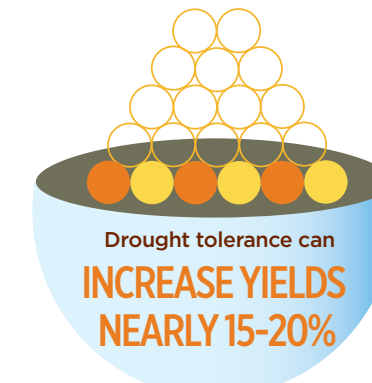
No-Till Agriculture

Farmers remove yield-robbing weeds using herbicide-tolerant varieties and crop protection products instead of tillage practices.



INCREASE YIELDS 67%

No-till can increase global maize yields on irrigated hectares¹



Drought tolerance can INCREASE YIELDS NEARLY 15-20%

in times of severe drought for these key regions in 2050¹



Drought Tolerance

Plant science researchers are developing plants that are drought-tolerant and water-efficient.

Plant Biotechnology

In 2012, biotech crops helped slow the advance of climate change by

REDUCING CARBON EMISSIONS 27 BILLION KG,

equivalent to 11.9 million cars off the road for a year, due to less tillage, less fuel use and more carbon capture²



Crop Protection

Insecticides, Herbicides, Fungicides

Crop protection products prevent nearly 40% of global rice and maize harvests from being lost every year.³



FUTURE PIPELINE

Plant science researchers are developing products that could revolutionize agriculture in

2050

Nitrogen-use efficient varieties

enable a crop to better absorb and utilize nitrogen fertilizers, reducing carbon footprints and enabling a good harvest even in a volatile climate. Biotech varieties are currently in development that could nearly double yields in Africa and Latin America when combined with irrigation.¹



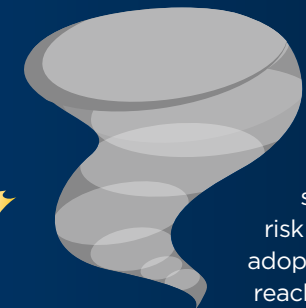
Heat-tolerant varieties

are in development for rice and wheat. If successfully created, they could cut global wheat and rice prices by approximately 10%.¹



Greater yield stability in erratic weather

Long-term studies of biotech crops find significant reductions in risk and yield volatility after adoption. As new varieties reach the market, farmers will continue to build their resilience to climate change.⁴



Greater control of insects, weeds and diseases through new crop protection products

could improve global staple crop yields 20-30% and African maize yields by nearly 50% in 2050.¹

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References

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- ² Brookes, Graham & Barfoot, Peter. GM Crops: Global socio-economic and environmental impacts 1996-2012
- ³ Oerke, E.C., 2006, "Crop losses to pests," Journal of Agricultural Science, vol. 144
- ⁴ Shi, Guanming et al., Commercialized transgenic traits, maize productivity and yield risk, Nature Biotechnology, February 2013