



# GRAIN FARM TECHNOLOGY

**TODAY'S GRAIN FARMERS** use sophisticated technologies to make farming more efficient and profitable, as well as safer and more environmentally friendly.

Farmers no longer have to apply seed, fertilizers, and pesticides (**inputs**) in the same amounts across entire fields. Instead, they can target specific areas of fields, minimizing the use of inputs and fuel while maximizing crop yields (amounts produced). This practice is referred to as **precision farming**.

Precision farming uses technology to analyze crop fields for soil fertility, moisture levels and crop production.



## MONITORS

on farm equipment such as combines, harvesters and tractors gather information, including grain yields, moisture levels, soil properties, etc. This information helps farmers understand the relationships between crop yields and field conditions so they can address potential problems and make improvements.

## VARIABLE RATE TECHNOLOGY

allows farmers to apply different amounts of inputs to different areas of each field. This technology can save money and reduce wastage by putting the right amounts specifically where needed, resulting in better crop growth and higher yields.

## MAPPING TECHNOLOGY

Using GPS and/or UAV technology, maps can be developed so that farmers can see each field at a glance. Based on map information, farmers can make decisions about, for example, where to apply fertilizer and pesticide and how much to use.

## GUIDANCE TECHNOLOGY

can be applied to tractors, combines and other farm equipment to help farmers by automatically steering equipment in the field, guided by **GPS (Global Positioning System)**. Because the machines' work is so accurate, just the right amount of input products are used when seeding or fertilizing.

## REMOTE-SENSING

cameras on **UAVs** (unmanned aerial vehicles – also known as **drones**) pick up specific wavelength frequencies that are reflected by plants. Crops damaged by disease, pests or lack of nutrients reflect wavelengths that are invisible to the naked eye but can be seen by aerial sensors, allowing farmers to address problems before they spread to other areas of their fields.



New technology often requires new equipment, which can be very expensive. Farmers are adopting new technologies in varying degrees. For example, a farmer may use monitors and guidance systems but not auto-steer or variable rate technology. Technological advancements in farming are making farms more efficient and sustainable, ensuring the production of safe, healthy food now and into the future.



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## ADVANCES IN FARM EQUIPMENT

Tractors, combines, and other farm equipment have become bigger so that machines with one operator can cover more ground in less time.

Technology has also allowed farmers to be more environmentally friendly. Some equipment can now multitask, which means that it can do more than one job at the same time. For example, fertilizer can be applied along with seed at seeding time. Doing several jobs simultaneously reduces fuel usage and the amount of time that farmers spend in their fields.



Farmer applying seed and fertilizer to field



## GRAIN STORAGE

Grain can mold when it is wet and hot. Moisture sensors and temperature gauges built into storage bins help farmers determine when to ventilate to prevent grain spoilage. Ventilation involves circulating cold, dry air through grain housed in bins to remove excess moisture and keep grain dry.

## Changes in farming practices

Instead of tilling the land to plant their crops, most grain farmers now practice **conservation tillage**. Farmers use special equipment to plant seed without disturbing the soil through tillage. The stalks (**stubble**) from the previous crop are left in the ground to hold soil in place. This practice helps prevent soil erosion, keeps soil healthy and retains soil moisture.



## BIOTECHNOLOGY

**Genetic engineering (GE)** is a modern plant-breeding technique that introduces desirable traits to crops or reduces undesirable traits. Some GE crops are herbicide tolerant, meaning that they allow farmers to use specific herbicides to kill surrounding weeds while leaving the crop unaffected. Growing herbicide tolerant crops helps farmers practice conservation tillage.

Other types of GE seed can improve crops' resistance to insects, disease and/or drought.

Modern genetic techniques can be a very efficient way to develop crop varieties with characteristics that would take much longer using traditional breeding techniques.



Farmer checks wind gauge before spraying