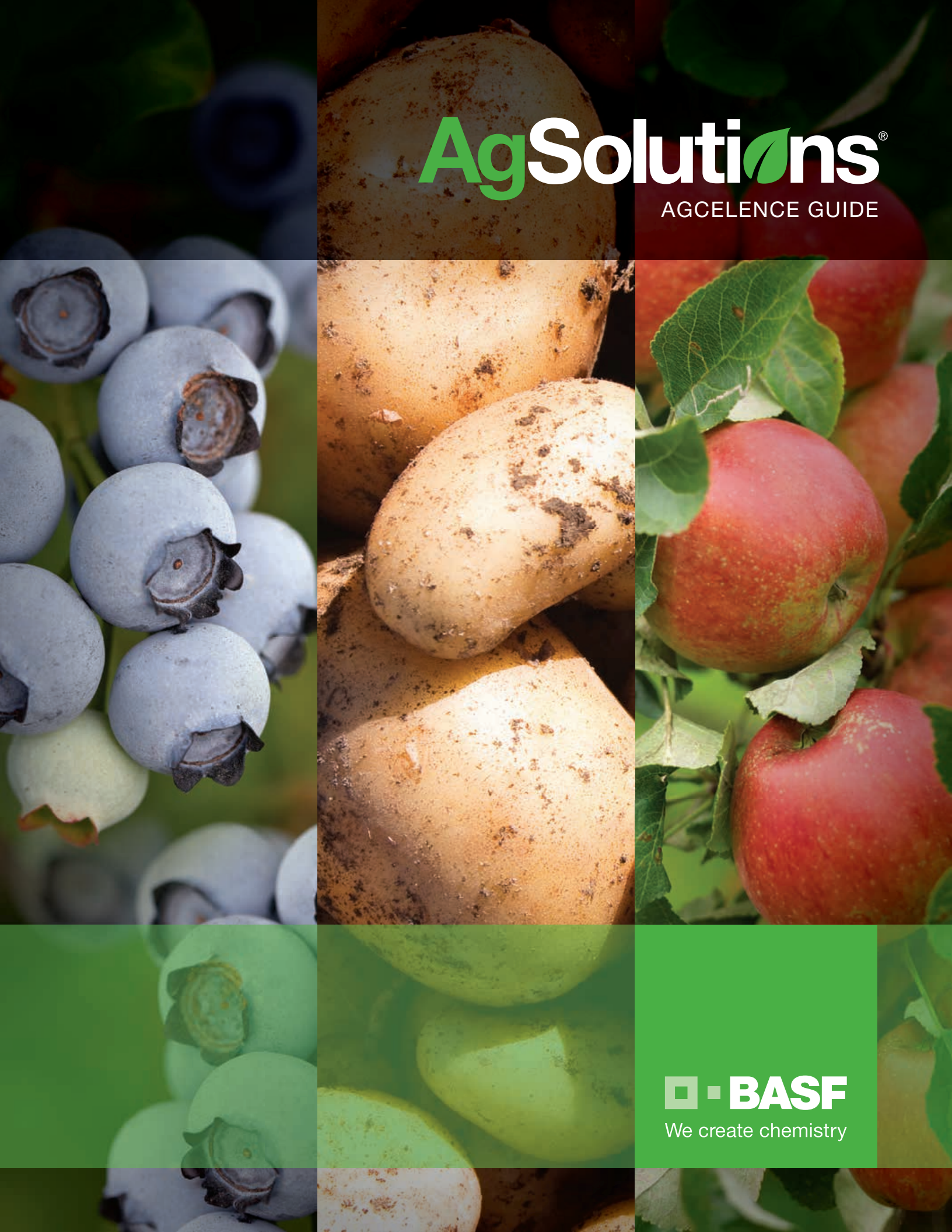

AgSolutions®

AGCELENCE GUIDE

BASF

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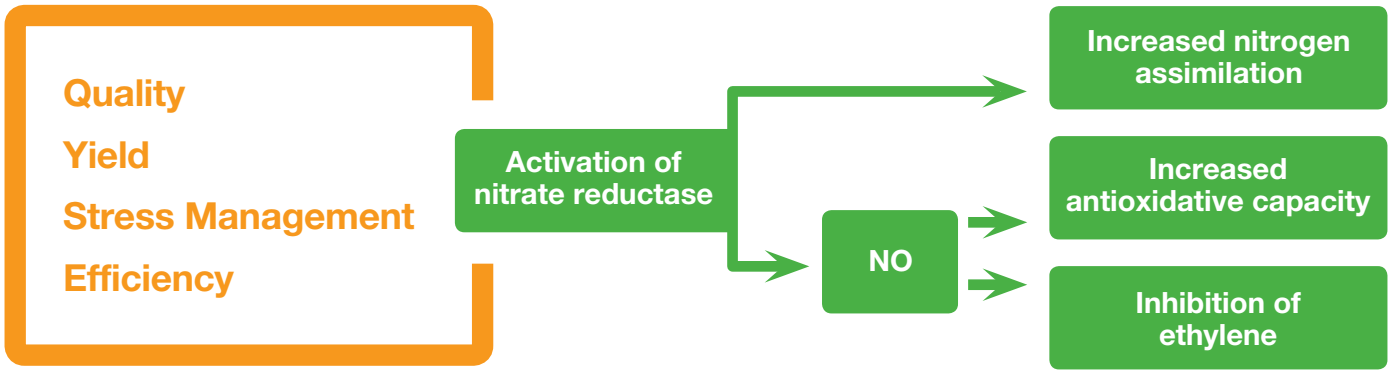
What makes AgCelence so excellent?

The background science

BASF scientists have created many of the most important developments in modern agricultural inputs. One such discovery was the fungicide PYRACLOSTROBIN. This active ingredient has been shown to be a very effective active ingredient for the control of many important diseases. Growers noticed that it also seemed to prolong the crop-growing period. Crops stayed green for a longer period of time. They also seemed better able to manage stress. It was very surprising, but research has shown how it works. This is how the **AgCelence** concept was born.

With AgCelence, increased growth efficiency and better stress management results in more yield potential for crops.



AgCelence is not magic. Its positive influence on crop performance and plant stress is due to a complex range of physiological effects in the plant which come from the energy centre of the plant cell. The **AgCelence** benefit acts by blocking electron transport within the mitochondrial respiratory chain. This reduces the amount of available ATP (adenosine triphosphate) and lowers the cytosol pH. These combined effects activate the enzyme nitrate reductase. This is the key to unlocking further plant physiological processes that generate **AgCelence** benefits which may include:

- Increased nitrogen assimilation
- Formation of nitrogen oxide (NO) leading to:
  - inhibition of stress-induced ethylene production
  - increased antioxidative capacity (or: reduced oxidative stress)

Increased nitrogen assimilation

When plants assimilate nitrogen, they use the nitrogen compounds ammonium (NH_4) and nitrate (NO_3) to build up nitrogenous organic compounds, for example proteins. **AgCelence** products can enhance nitrogen assimilation by increasing nitrate reductase activity in the plants.

Inhibition of ethylene biosynthesis

Nitrate reductase, which has already been mentioned, releases nitrogen oxide (NO) in the plant cells which in turn triggers further important processes, such as the inhibition of ethylene synthesis.
Ethylene is a hormone that plants produce in response to stress. Plants also produce ethylene in response to injury, when they mature, prior to leaf, flower or pod loss and before pathogen-triggered cell death. Plants sacrifice important contributors to yield such as leaves, flowers or pods in an attempt to reduce the effects of stress. Reducing ethylene production is a means of limiting this natural response. **AgCelence** products based on PYRACLOSTROBIN cause plants to show fewer stress symptoms. This means that during the stress phase they may produce less ethylene. The ability of plants treated with **AgCelence** products to better manage drought stress has been particularly well researched.

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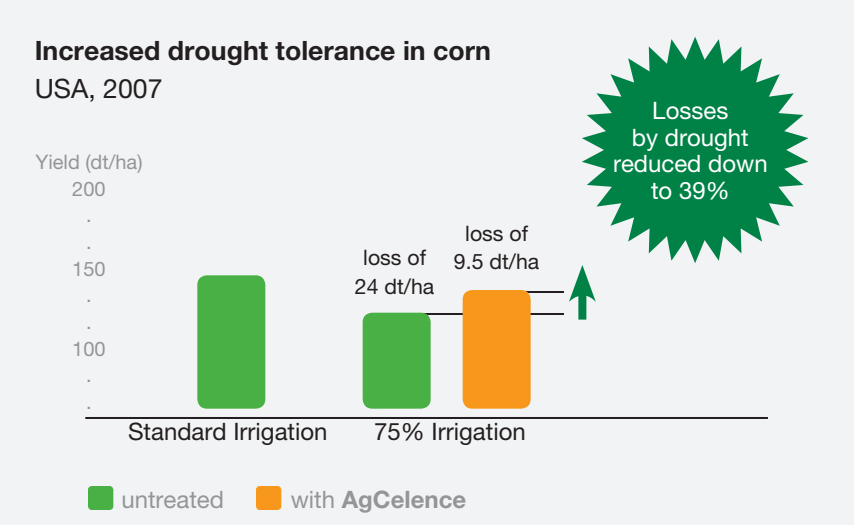
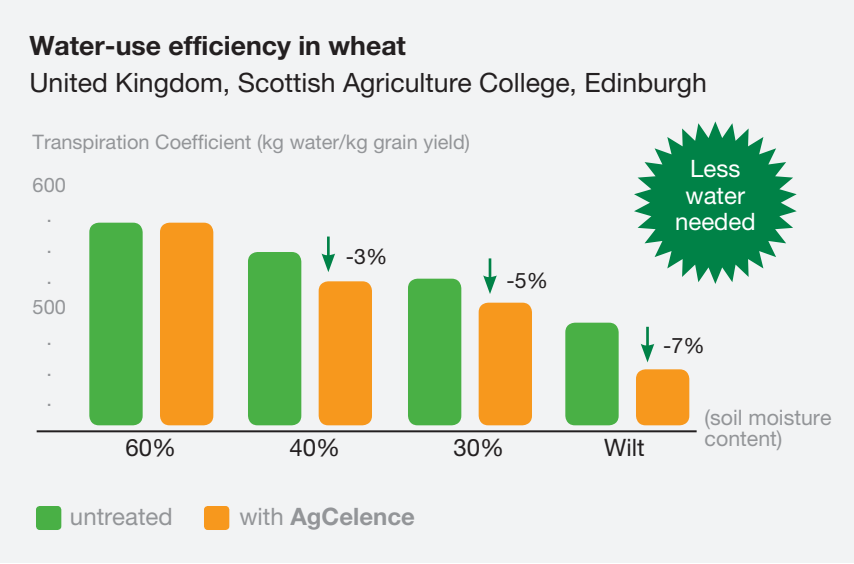
Crop tolerance to drought

Plants under drought stress produce more ethylene. This triggers senescence (aging). Leaves begin to wilt and die. The loss of green leaves limits the plant's ability to photosynthesize sufficiently and consequently to maximize yield potential. When crops are treated with **AgCelence** products and then subject to stress:

- Emissions of ethylene may be reduced
- Stomata management may be influenced to maintain photosynthesis to a certain extent
- Premature ripening may be less likely to occur





The above graph shows results from crops treated with **AgCelence** products under dry conditions compared with untreated crops. The **AgCelence** benefit here gives a consistent advantage in terms of yield – even where moisture availability is just 50% of the recommended standard.

Increased antioxidative capacity

The nitrogen oxide (NO) produced by the nitrate reductase activated by **AgCelence** has a further important effect in addition to reducing ethylene-induced stress. Nitrogen oxide can release antioxidative enzymes which mop up dangerous free radicals. Plants produce free radicals in response to dangerous external influences, for example after injury or exposure to strong UV radiation. This is known as ozone damage and has been particularly well researched. Continuous exposure to hot sunshine is yet another stress factor that can be successfully relieved through the use of **AgCelence** products. Cereals, particularly some barley varieties, react to these conditions by developing a scorching condition known as physiological leaf spot (PLS), which leads to necrosis of leaf tissue and very high yield losses. The **AgCelence** benefit stimulates activity of an antioxidative enzyme called SOD (superoxide dismutase) which acts like a sunscreen and can reduce the development of physiological leaf spot. This is another factor that may prolong the green growing period and help plants keep filling grain, even under heat stress.

The performance of AgCelence.

*Courtesy of BASF Healthy Crop program

Always read and follow label directions.

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