

Developments in drought tolerant technology

By Martin Mariani Ventura, Verdeca

Drought is a major limitation for crop yields worldwide. Even under moderate drought conditions, crop yields can be reduced significantly.

Verdeca's drought tolerance HB4[®] technology has the potential to moderate the impact of drought and stabilise crop yields under a broad range of production conditions. Plants respond to water stress by expressing a specific set of genes that allow them to adapt to changing environmental conditions.

Genetic breakthrough

Despite significant progress using transgenic technology, farmers never had a soya bean technology that increased yield under drought conditions.

At the end of the 1990s, a team of Argentine researchers from the National Scientific and Technical Research Council, CONICET, led by Dr Raquel Chan from the National University of the Coast, found a sunflower gene that activated plants' response to mechanisms of abiotic stress

(water and salts). The researchers focused on HaHB4, a sunflower gene encoding a transcription factor that was shown to confer drought tolerance when it was introduced into *Arabidopsis thaliana*.

After the isolation and characterisation of this gene, Verdeca began collaborating with Dr Chan to develop HB4[®] technology in plants of agronomic interest.

Promising results

Our results in HaHB4 soya bean support the previously reported phenotypic characteristics observed in *Arabidopsis*. HB4[®] soya bean plants showed a higher recovery rate after a period of water deprivation, lower sensitivity to ethylene and delayed senescence (cell deterioration) when compared to the non-transgenic control plants.



HB4[®] plants show an increase in yield in adverse environmental conditions when compared with unmodified plants.

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Based on the results of our field experiments in Argentina and the United States, we conclude that HB4[®] soya bean is a biotechnological tool that could be incorporated feasibly to manage water stress in a wide range of situations, conferring significant yield increases in low-yielding, rainfed areas with no yield penalties in high-yielding ones.

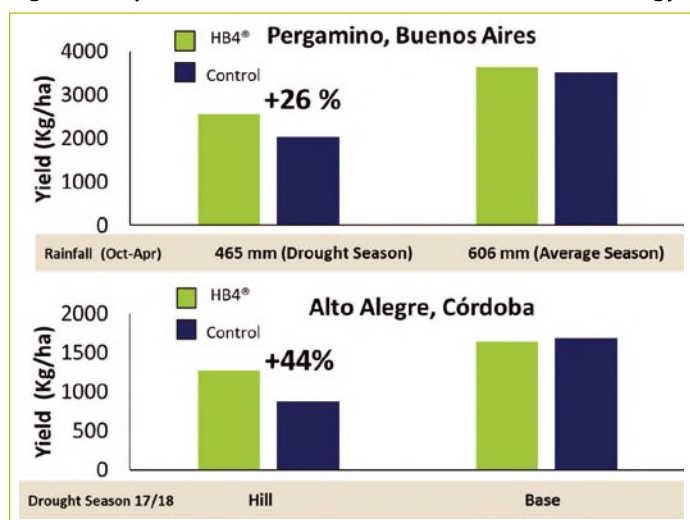
Reducing the impact of drought

Crops with HB4[®] technology are better prepared to cope with drought and use available water resources more efficiently. Unlike other drought tolerance strategies, HB4[®] technology simultaneously controls multiple critical processes of plant metabolism to reduce the impact of drought on crop productivity.

Additionally, the absence of yield penalties under conditions where water resources are adequate is a critical feature of the HB4[®] trait.

Verdeca's objective is to submit the dossier for this technology in South Africa and start the regulated field trial requirements before the end of the year. 🌱

Figure 1: Soya bean isolines with and without HB4[®] technology.



In the face of drought, HB4[®] causes a delay in the cellular deterioration of plants. This allows the crop to keep all its processes running, instead of interrupting them in the face of water restriction. In this way, at the end of the period, HB4[®] plants show an increase in yield in

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