Solving environmental stress in agriculture

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Chemical tools as **actuators** for precision ag

Action

Analysis

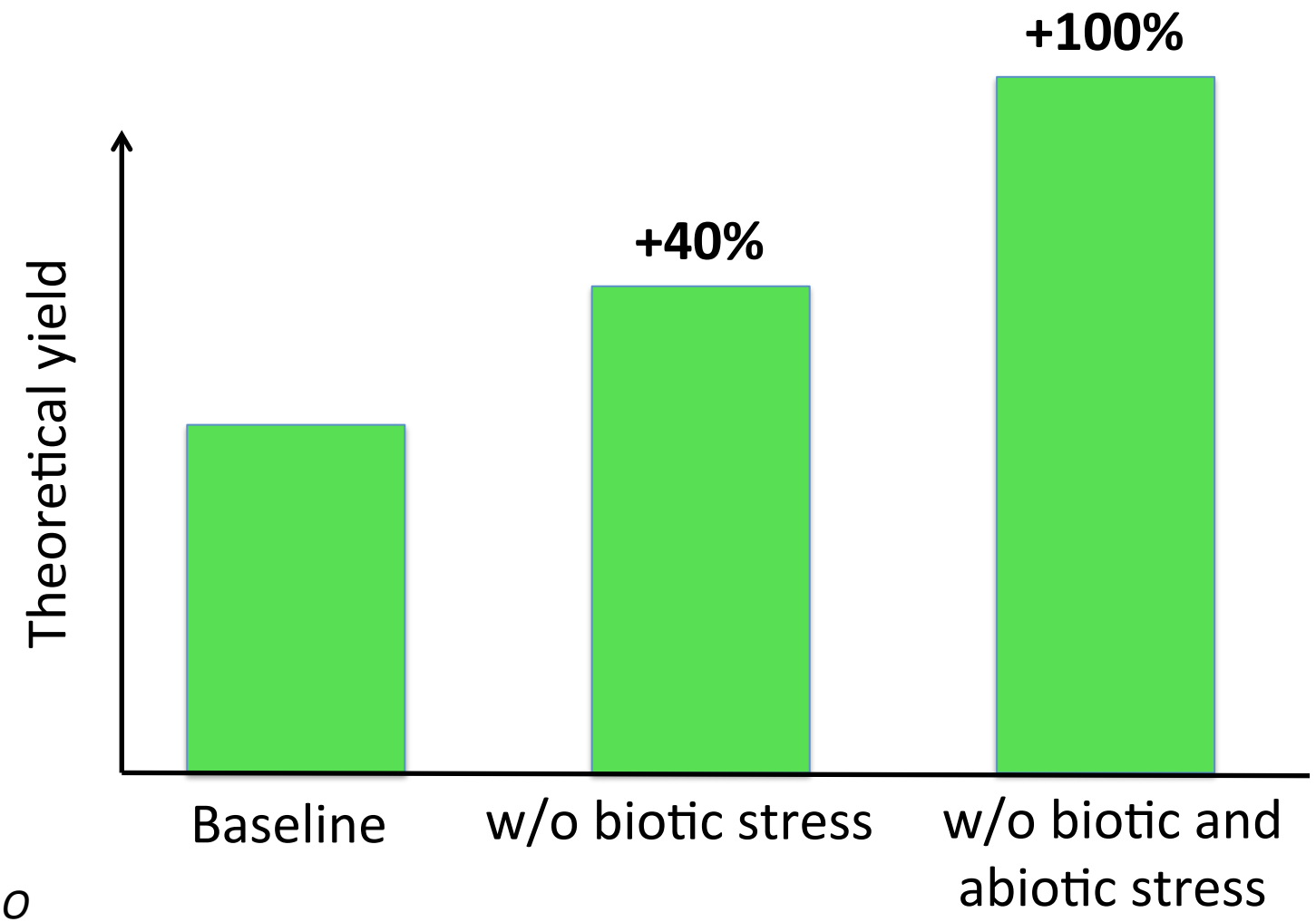
Data

Chemical tools as **actuators** for precision ag

Action

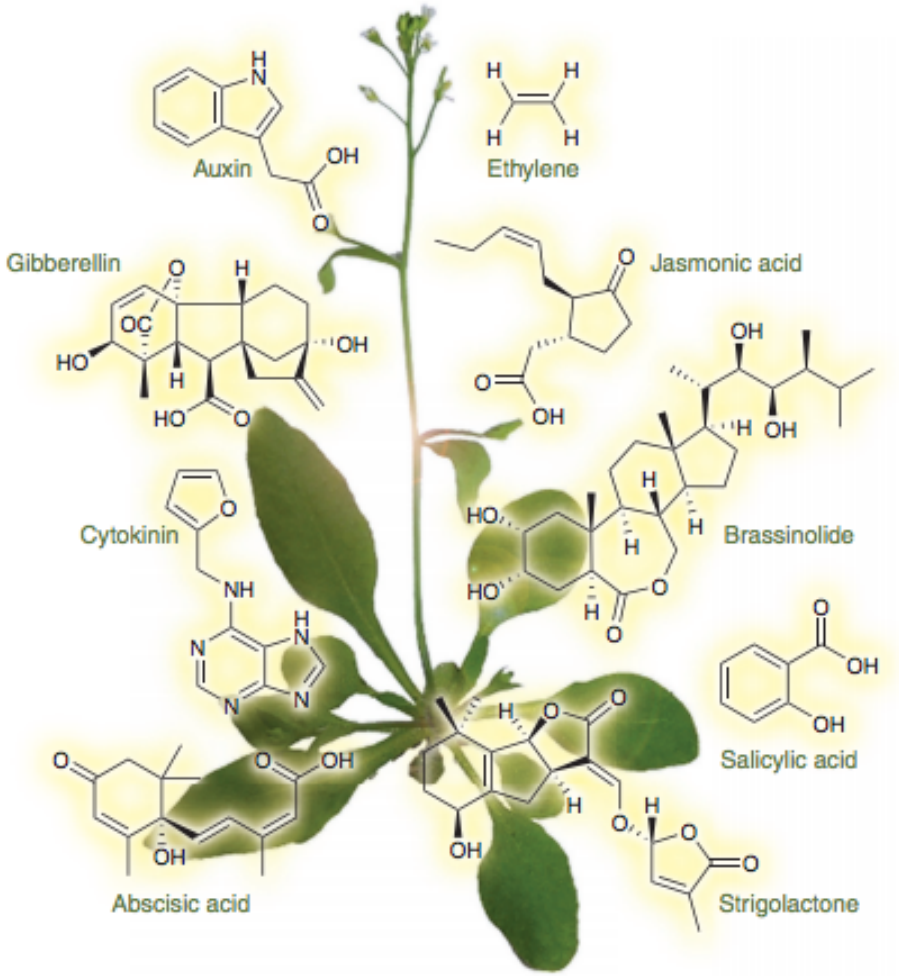
Improve resource **efficiency**
Increase **productivity**

Solving abiotic stress is the next opportunity for a step change in productivity

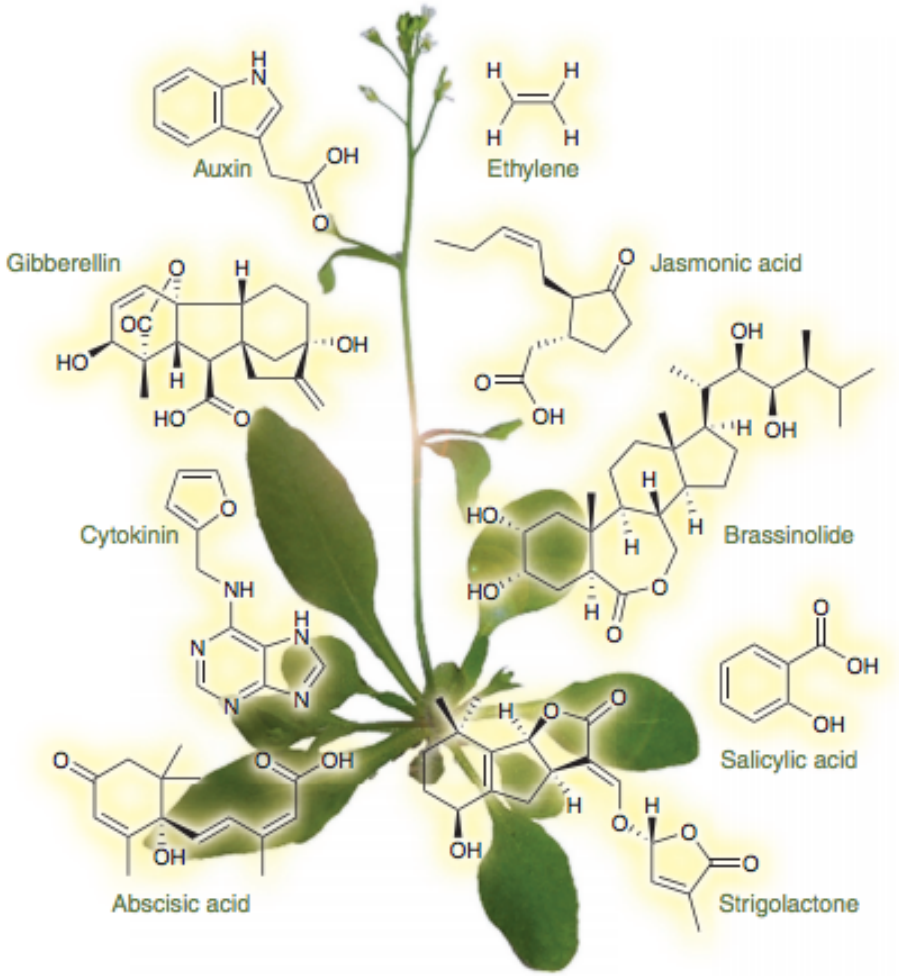


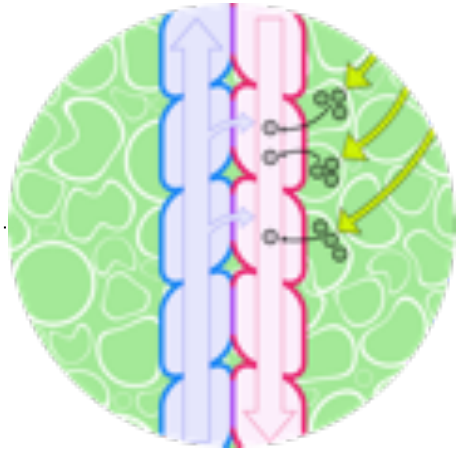
Source: FAO

Plant response to abiotic stress is controlled by plant growth regulators



We leverage our insights to create synthetic PGRs with novel functions





Water transport regulation

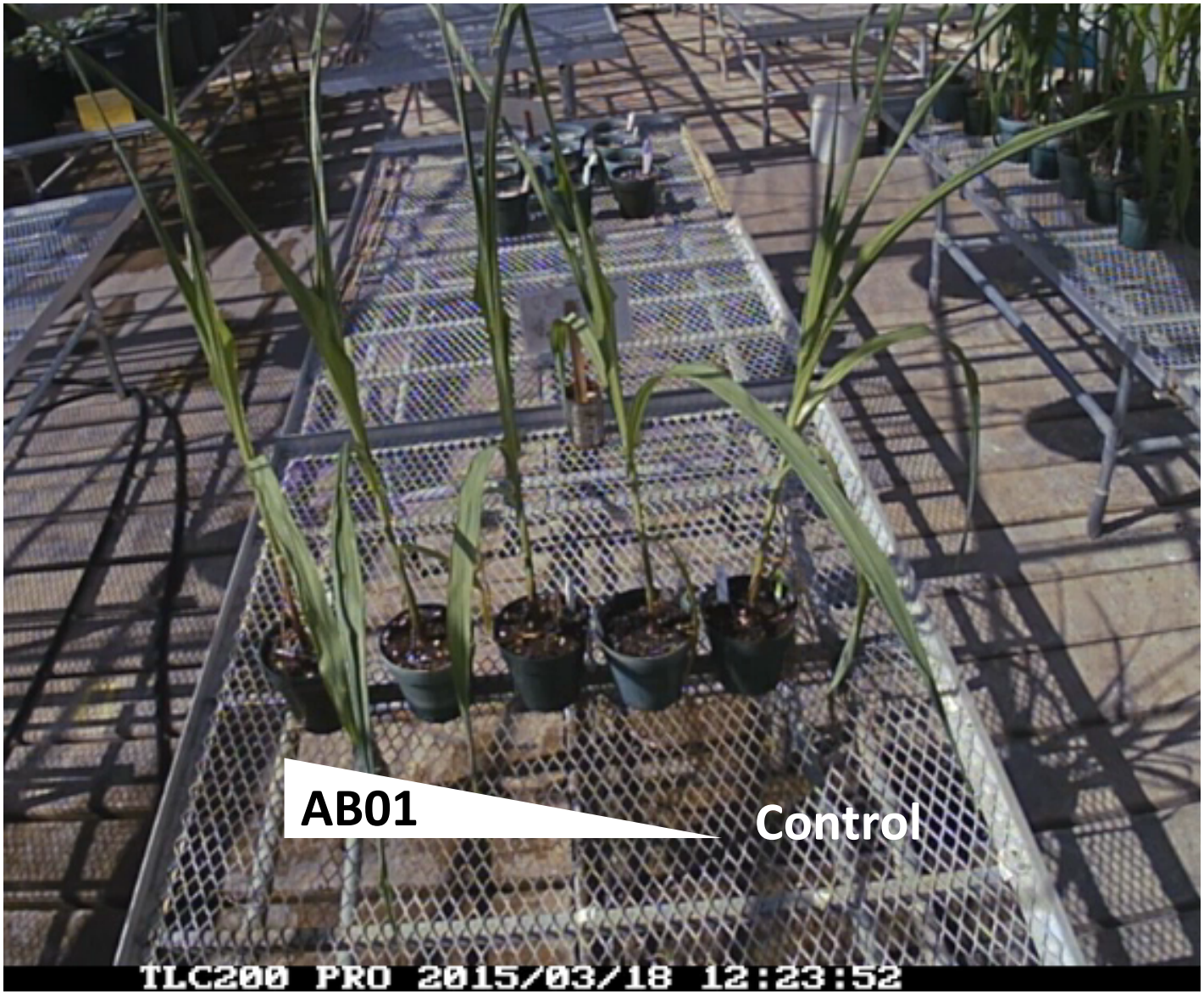
Chemistry for yield enhancement and stress mitigation

- Synthetic compound inspired by natural PGRs
- Enhances water transport in crops: reduced stress and **higher yield**
- Applied as a foliar spray or seed treatment
- Developing products for broad acre crops and vegetables

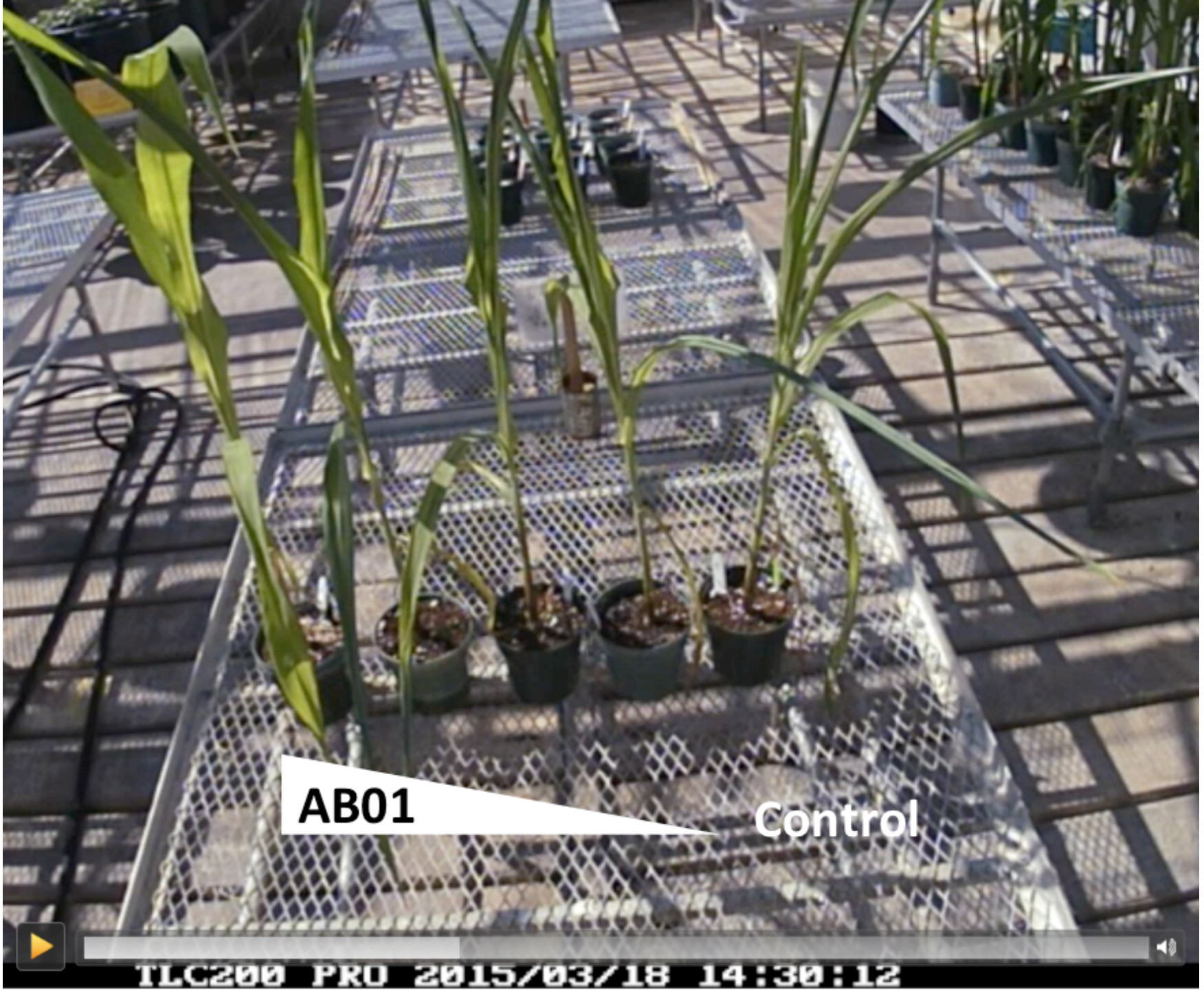
AB01 reduces wilting in dry soils

Mature *Capsicum annuum*

AB01 enhances recovery after irrigation




AB01
Control
TLC200 PRO 2015/03/18 12:23:52


AB01
Control
TLC200 PRO 2015/03/18 14:30:12


AB01
Control
TLC200 PRO 2015/03/18 15:00:52


AB01
Control
TLC200 PRO 2015/03/18 17:30:32

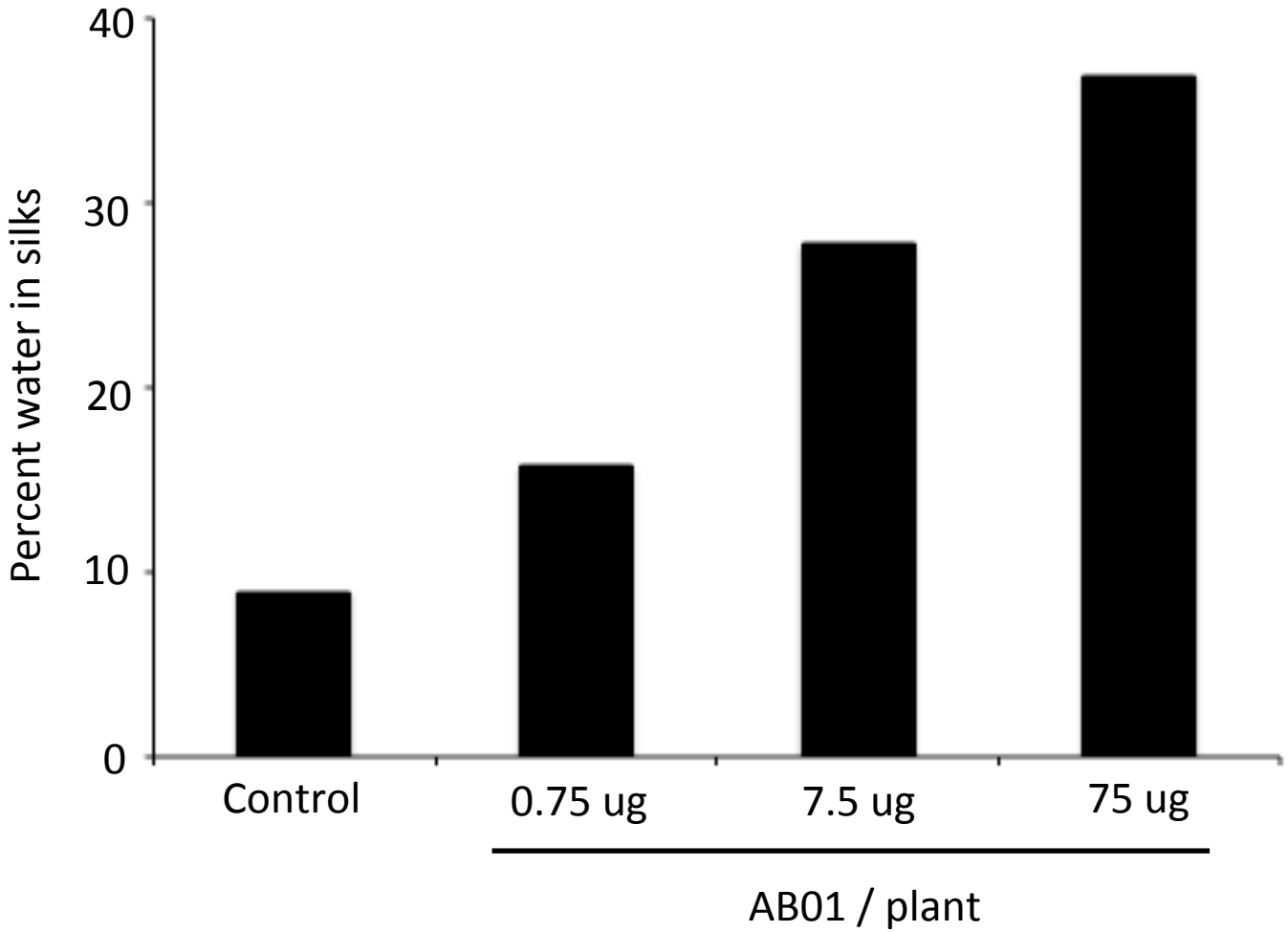
AB01 enhances silk hydration

Untreated DKC 68-05

+ AB01 seed treatment (75 ug/seed)

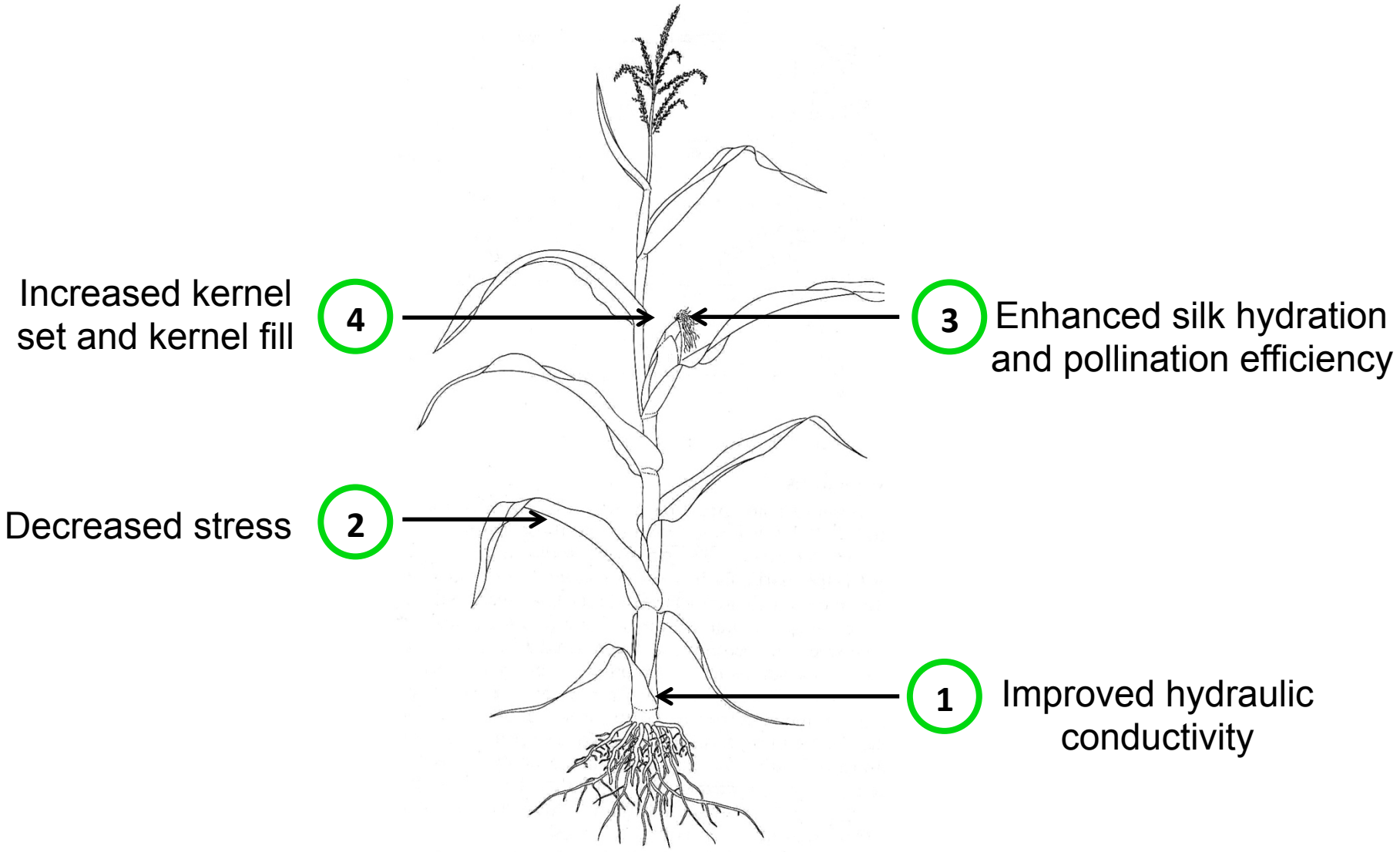
Plants grown in greenhouse with drip irrigation

AB01 enhances silk hydration



Plants grown in greenhouse with drip irrigation

Enhancing water transport for higher yields

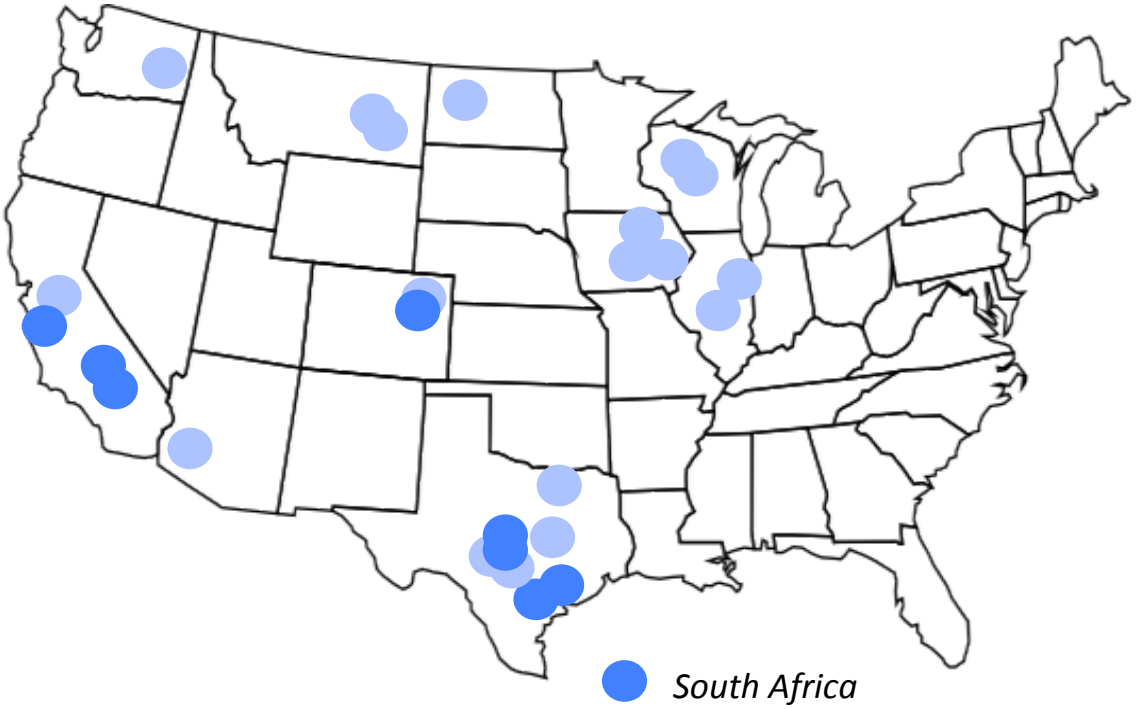


Zea mays

Field evaluations of AB01

30+ trials completed and in-progress

- **Corn**, soy, wheat, lettuce, tomato, pepper
- Foliar sprays and seed treatments
- Dose, timing, robustness
- Range of yield environments
- Focus on yield data and yield components

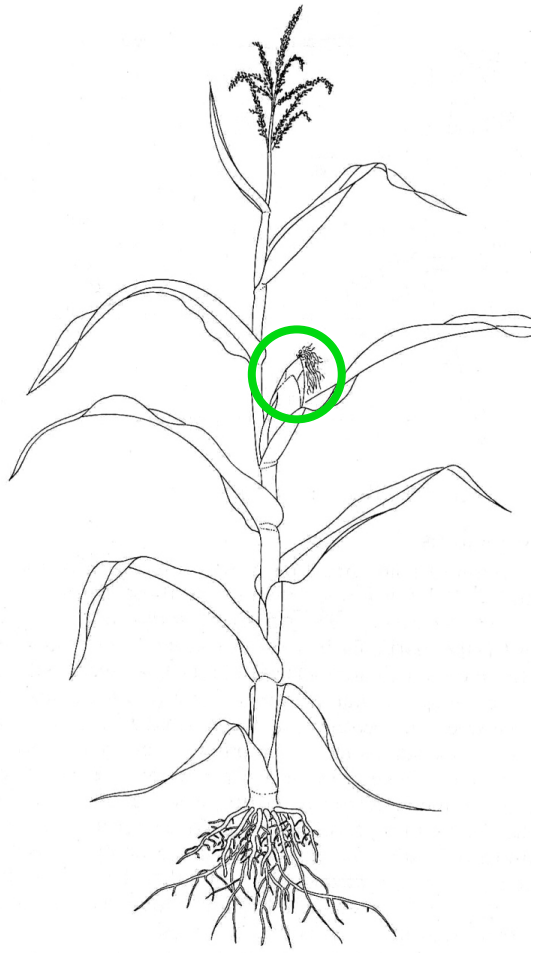


Fall Line Farms

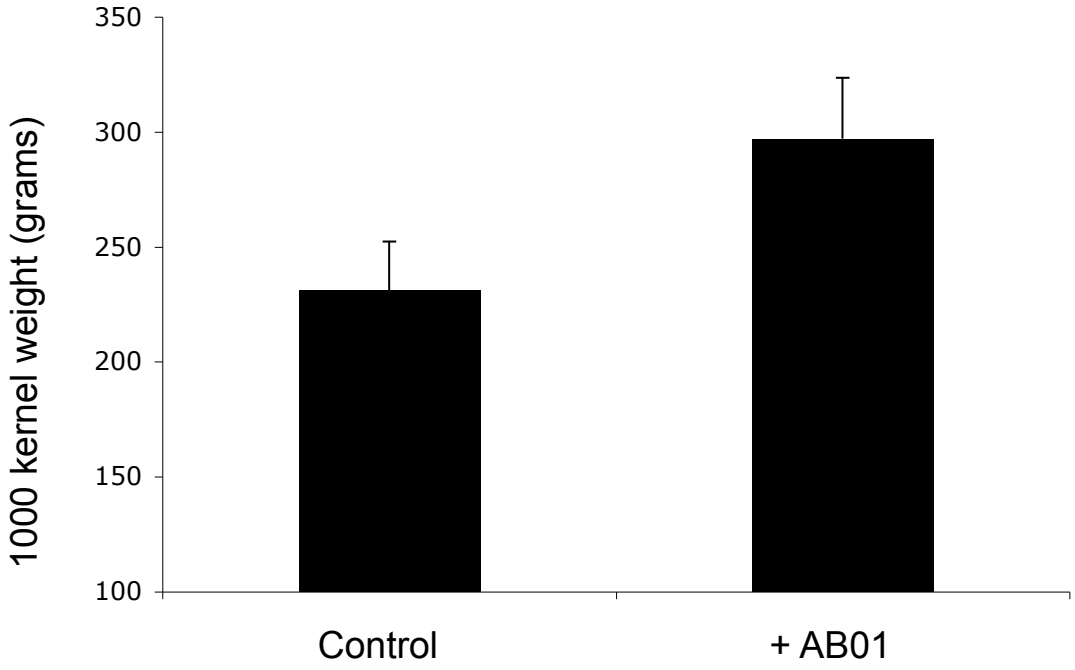
Field trials: increased kernel set

From 2014 field trial in Hays County, TX.
Dryland corn (DKC 68-05) at 25k plants / ac.

Field trials: increased kernel fill

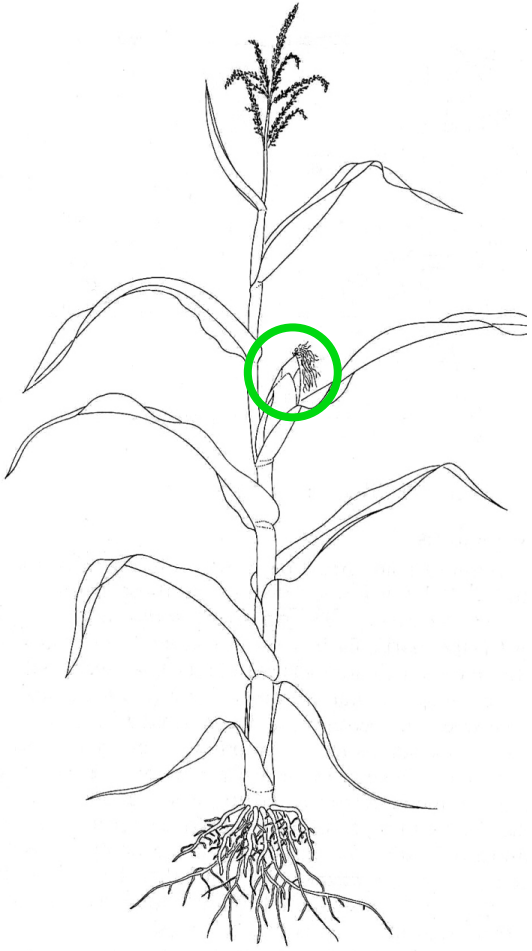


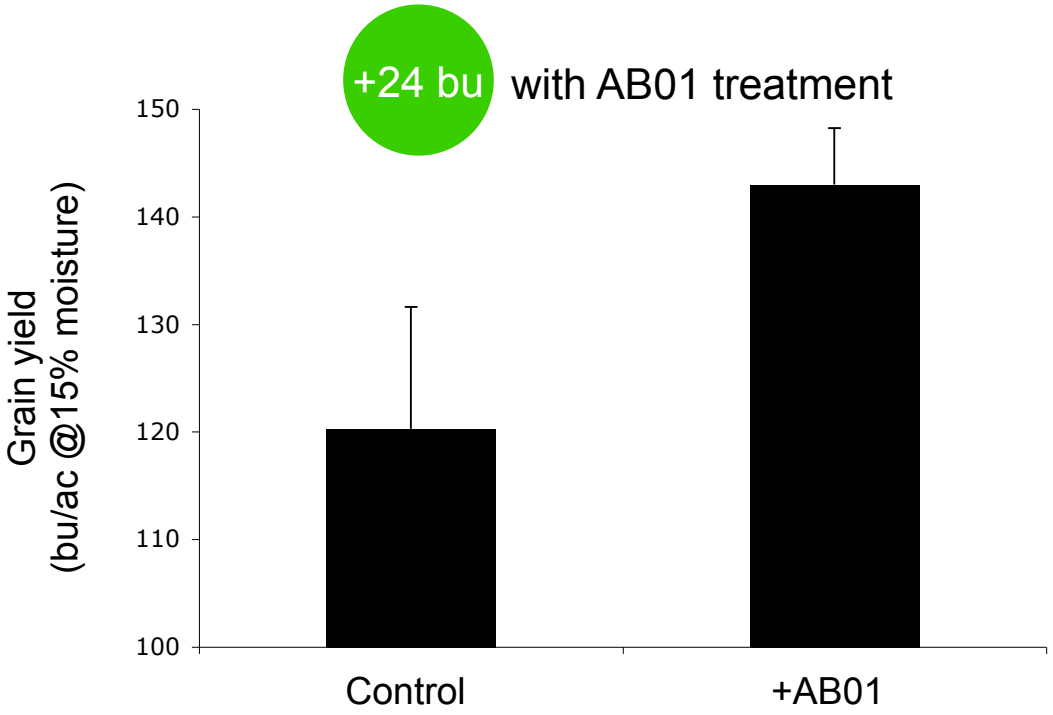
Increased kernel set and fill



From 2014 field trial in Hays County, TX.
Dryland corn (DKC 68-05) at 25k plants / ac.

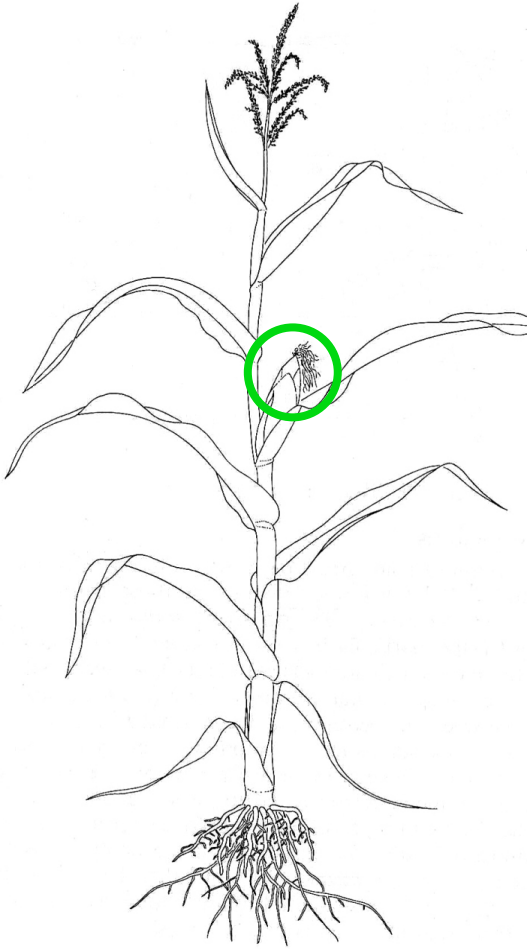
Field trials: enhanced harvest yield





From 2014 field trial in Hays County, TX.
Dryland corn (DKC 68-0)5 at 25k plants / ac.

AB01 performs across yield environments



Managed stress field trials – Fresno, CA (2014)

‘Moderate’ stress trial

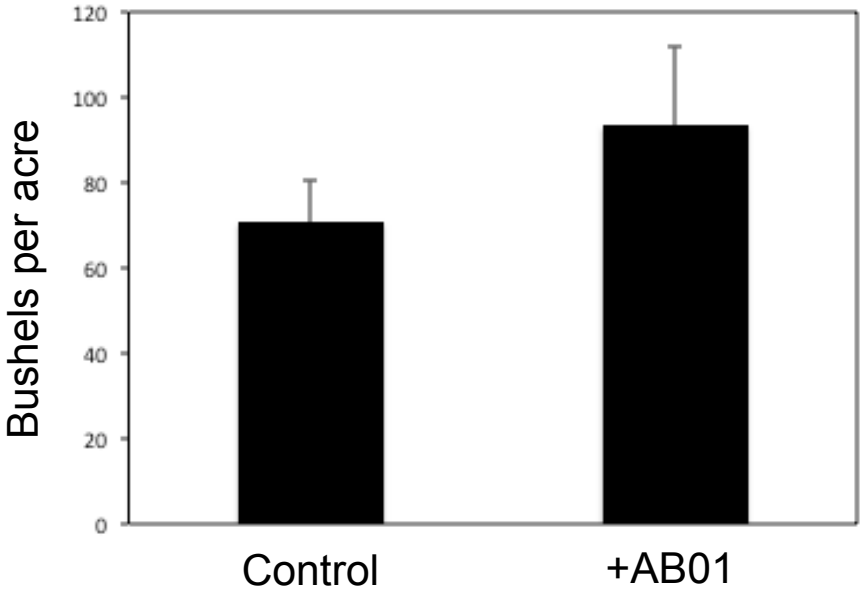
- Irrigation reduced to 50% ET, 10 days prior to tasseling
- Full irrigation resumed 10 days after tasseling

‘Severe’ stress trial

- Irrigation reduced to 10% ET, 10 days prior to tasseling
- Full irrigation resumed 10 days after tasseling

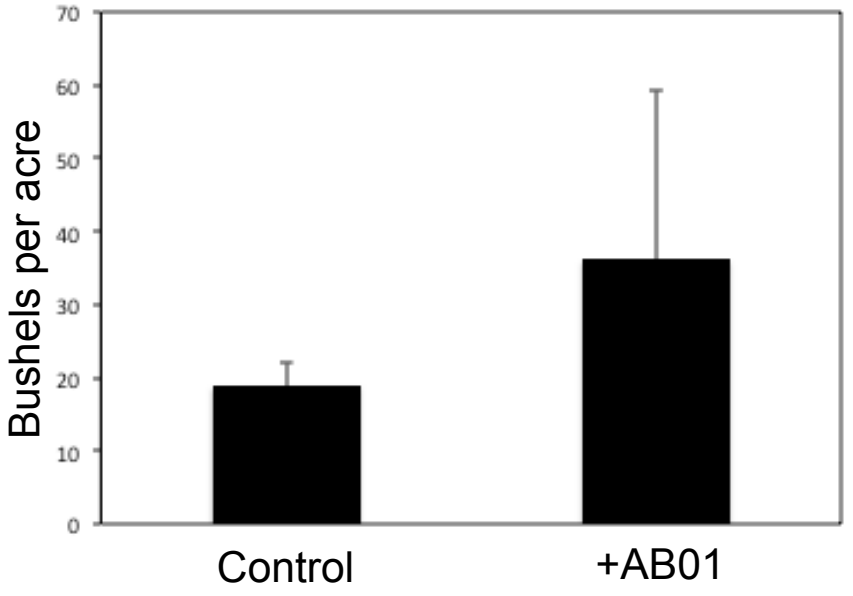
Enhanced yield under drought stress

'Moderate' stress



+23 bu with AB01 treatment

'Severe' stress



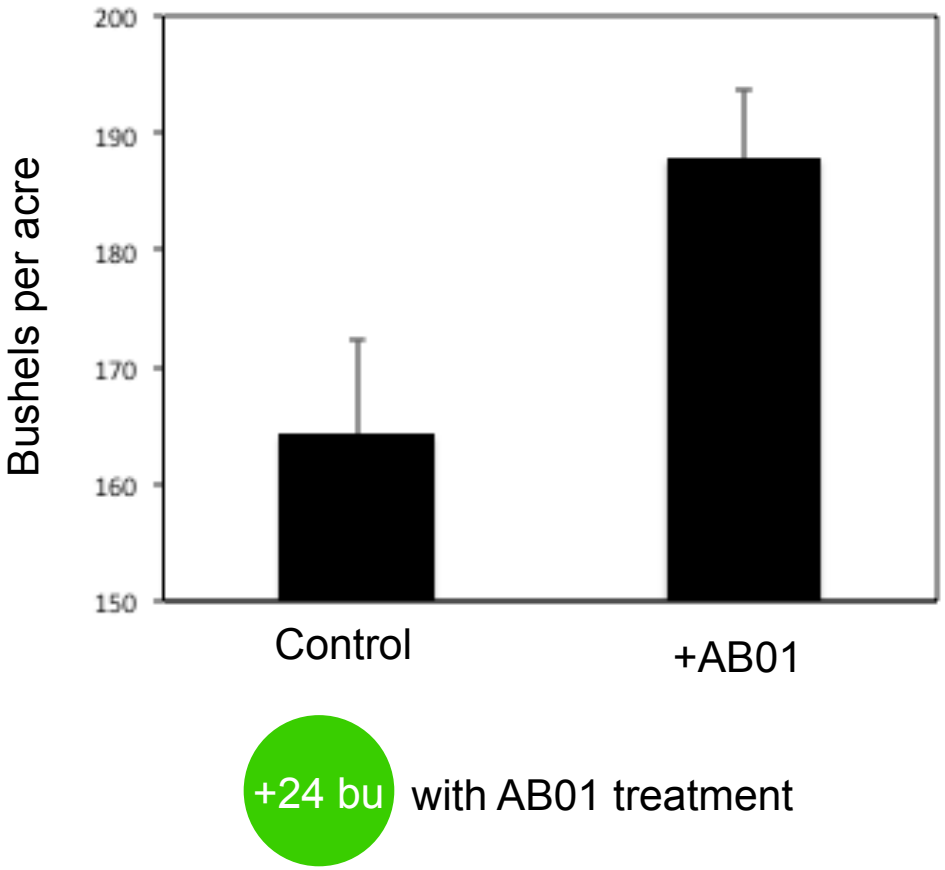
+17 bu with AB01 treatment

From 2014 field trials in Fresno County, CA.
P2088AM with managed irrigation

Enhanced yield in good dryland conditions

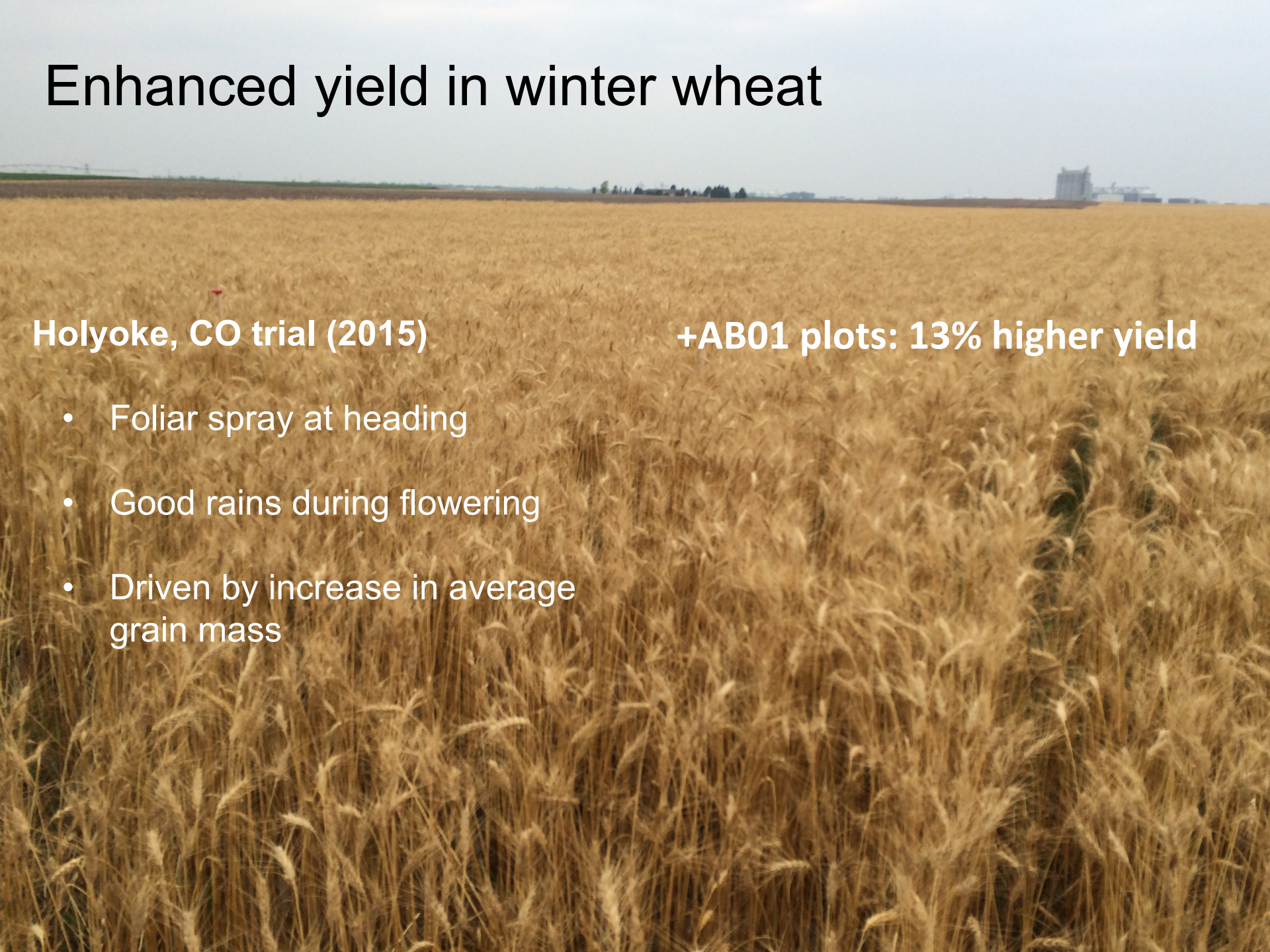
Brondal, S. Africa trial (2015)

- Good rainfall (29” during season and evenly distributed)
- Plants did not show symptoms of stress
- Control plot yields were considered excellent for the region



From 2015 field trials Brondal, South Africa.
PAN 6R-680 at 20k plants / ac

Enhanced yield in winter wheat



Holyoke, CO trial (2015)

- Foliar spray at heading
- Good rains during flowering
- Driven by increase in average grain mass

+AB01 plots: 13% higher yield

Current efforts

Understanding molecular mechanism and plant physiology

Extensive field testing: corn, soy, wheat, vegetables

Building channel and grower partnerships

Expected product launch in 2017

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