



Potential of Plant Growth Regulators in Pea Production

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Outline:

- ❖ Introduction
- ❖ What are Plant Growth Regulators?
- ❖ Potential in pea production
 - ❖ Trial design
 - ❖ Effects

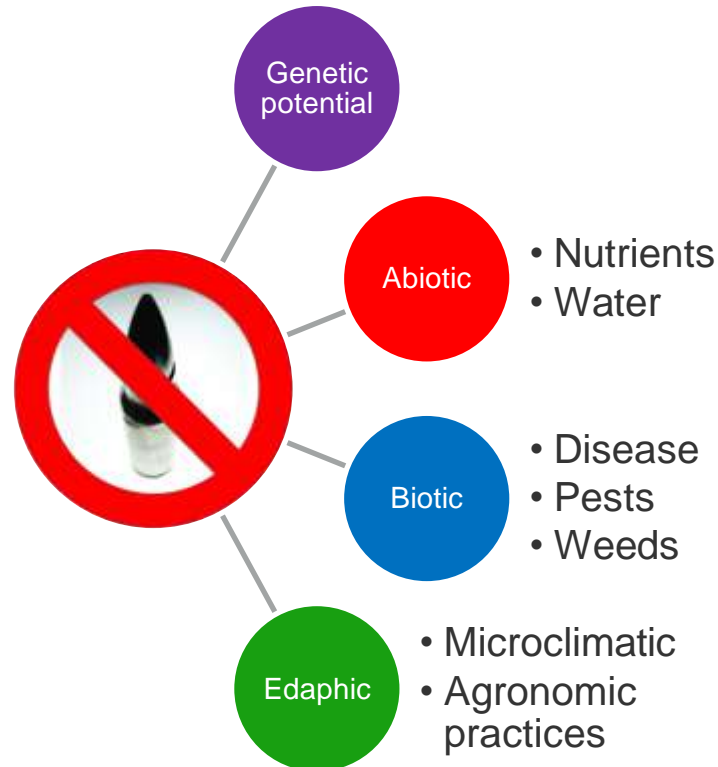
RESEARCH INTERESTS:

- » Agricultural Research and Development Manager
 - » Botanical Resources Australia Pty. Ltd.
 - » Plant growth regulator research with Valent BioSciences Pty. Ltd.
- » Field Crops group at Plant & Food Research
 - » Multi-disciplinary approaches to crop loss (“Mind the gap”)
 - » Vegetables, forage and arable crops



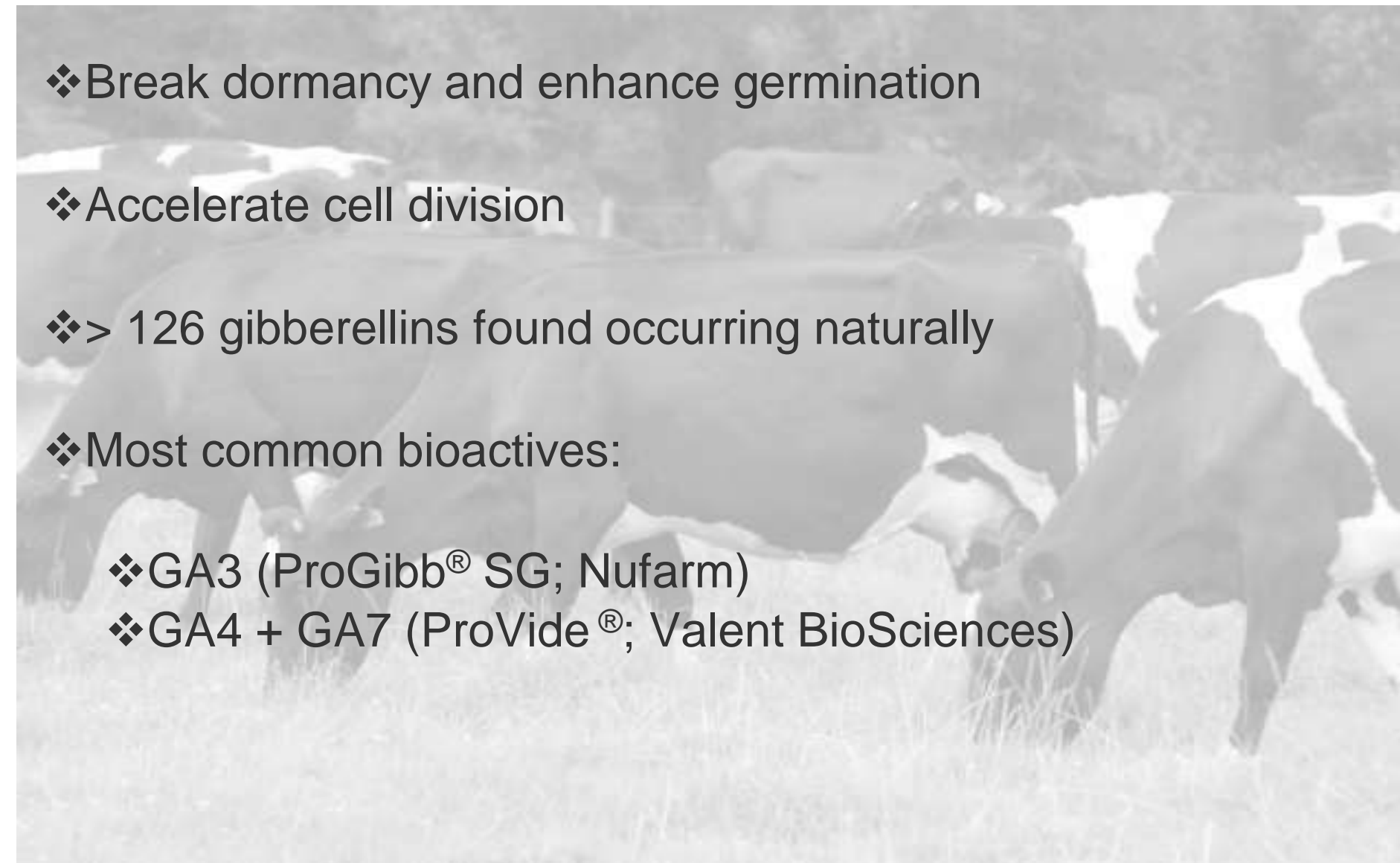
Plant Growth Regulators (PGRs)

- ❖ Compounds for manipulating plant growth and enhancing productivity
 - ❖ Simulate plant hormones that regulate growth and development
- ❖ Gains realized when other abiotic and biotic factors are not limiting

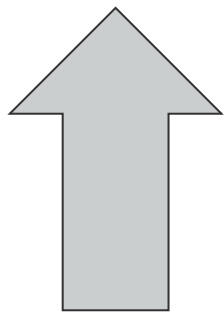


Types of PGRs – Gibberellins

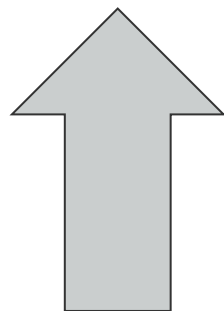
- ❖ Break dormancy and enhance germination
- ❖ Accelerate cell division
- ❖ > 126 gibberellins found occurring naturally
- ❖ Most common bioactives:
 - ❖ GA3 (ProGibb[®] SG; Nufarm)
 - ❖ GA4 + GA7 (ProVide[®]; Valent BioSciences)



Types of PGRs – Gibberellins



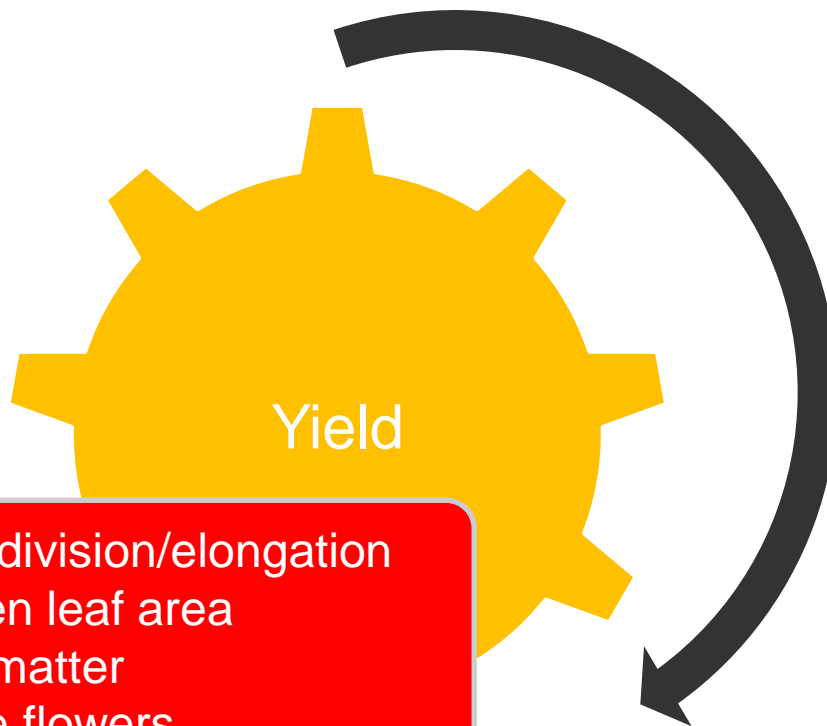
30 to 60% within 3 weeks
(winter pasture)



20 to 35% within 2 weeks
(pyrethrum)

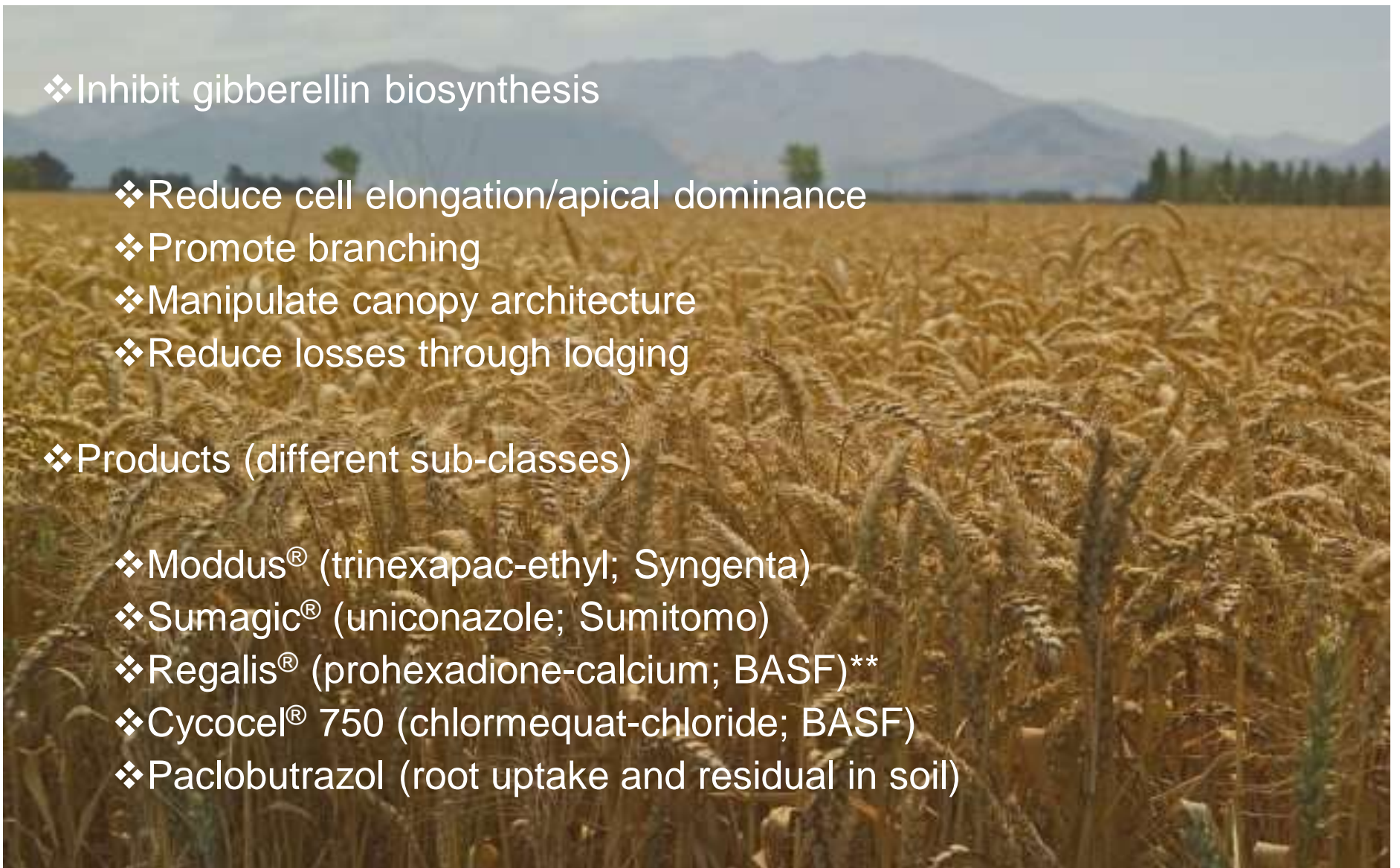


Types of PGRs – Gibberellins



- Cell division/elongation
- Green leaf area
- Dry matter
- More flowers

Types of PGRs – anti-Gibberellins

- 
- ❖ Inhibit gibberellin biosynthesis
 - ❖ Reduce cell elongation/apical dominance
 - ❖ Promote branching
 - ❖ Manipulate canopy architecture
 - ❖ Reduce losses through lodging
 - ❖ Products (different sub-classes)
 - ❖ Moddus[®] (trinexapac-ethyl; Syngenta)
 - ❖ Sumagic[®] (uniconazole; Sumitomo)
 - ❖ Regalis[®] (prohexadione-calcium; BASF)**
 - ❖ Cycocel[®] 750 (chlormequat-chloride; BASF)
 - ❖ Paclobutrazol (root uptake and residual in soil)

Types of PGRs – anti-Gibberellins

» *Sumagic (uniconazole-p)*:

- ❖ Anti-gibberellic acid (reduced losses through lodging; higher flower numbers)
- ❖ Replicated trials (4 years) + 33 demonstration trials
 - ❖ Rates/adjuvant requirement/timing, etc.
- ❖ Net benefit: \$300 to \$500/ha



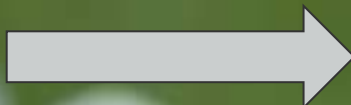
Types of PGRs – cytokinins

- ❖ Cell division and elongation
- ❖ Signals lateral bud growth
(enhancing green leaf area)
- ❖ Exilis[®] (6-benzyladenine; BASF)
- ❖ Formulations with GA (e.g. Promalin[®])



Types of PGRs – anti-ethylene

Prevents flower senescence



Higher number of pods

ReTain[®] (Aviglycine hydrochloride; NuFarm)

Types of PGRs – ABA

❖ “*Stress*” hormone

- ❖ Slows seed germination (ABA:GA)
- ❖ Prevents frost damage
- ❖ Slows flower maturation – change harvest windows

❖ ProTone[®] (Valent BioSciences)



PGRs - important considerations

- ❖ **Timing and rate (not always linear)**
- ❖ **Crop growth stage**
- ❖ **Water volume and nozzle type (enhance coverage and uptake by target) = 200 L/ha**
- ❖ **Surfactant often important**
 - ❖ 50 ml/200 L Contact Low Foam



PGRs in pea production

Gibberellin

- ProGibb[®] - 20 & 40 g/ha (GA3)

Anti-gibberellin

- Regalis[®] - 150 & 300 g/ha (prohexadione-calcium)

Anti-ethylene

- ReTain[®] - 20 & 40 g/ha (aviglycine hydrochloride)

Cytokinin

- Exilis[®] - 1.2 & 2.4 L/ha (6-benzyladenine)



PGRs in pea production

Gibberellin

- ProGibb[®] - 20 g/ha (GA3)



Preliminary Results

PGR type (1x rate only)	Population (plants/m ²)	Fresh yield (t FW/ha)	Pods per plant (#)
Nontreated	67	9.5 b	6
GA - early (ProGibb)	81	9.1 b	4
Anti GA - early (Regalis)	91	11.7 a	5
Anti GA - flowering (Regalis)	110	9.6 b	5
Anti ethylene - flowering (ReTain)	79	9.2 b	5
Cytokinin - early (Exilis)	88	9.3 b	5
Significant response?	No ($P=0.28$)	Yes ($P=0.01$)	No ($P=0.59$)

Improving flower synchronicity and yield



Acknowledgements:



www.microfarm.landwise.org.nz

www.plantandfood.co.nz

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