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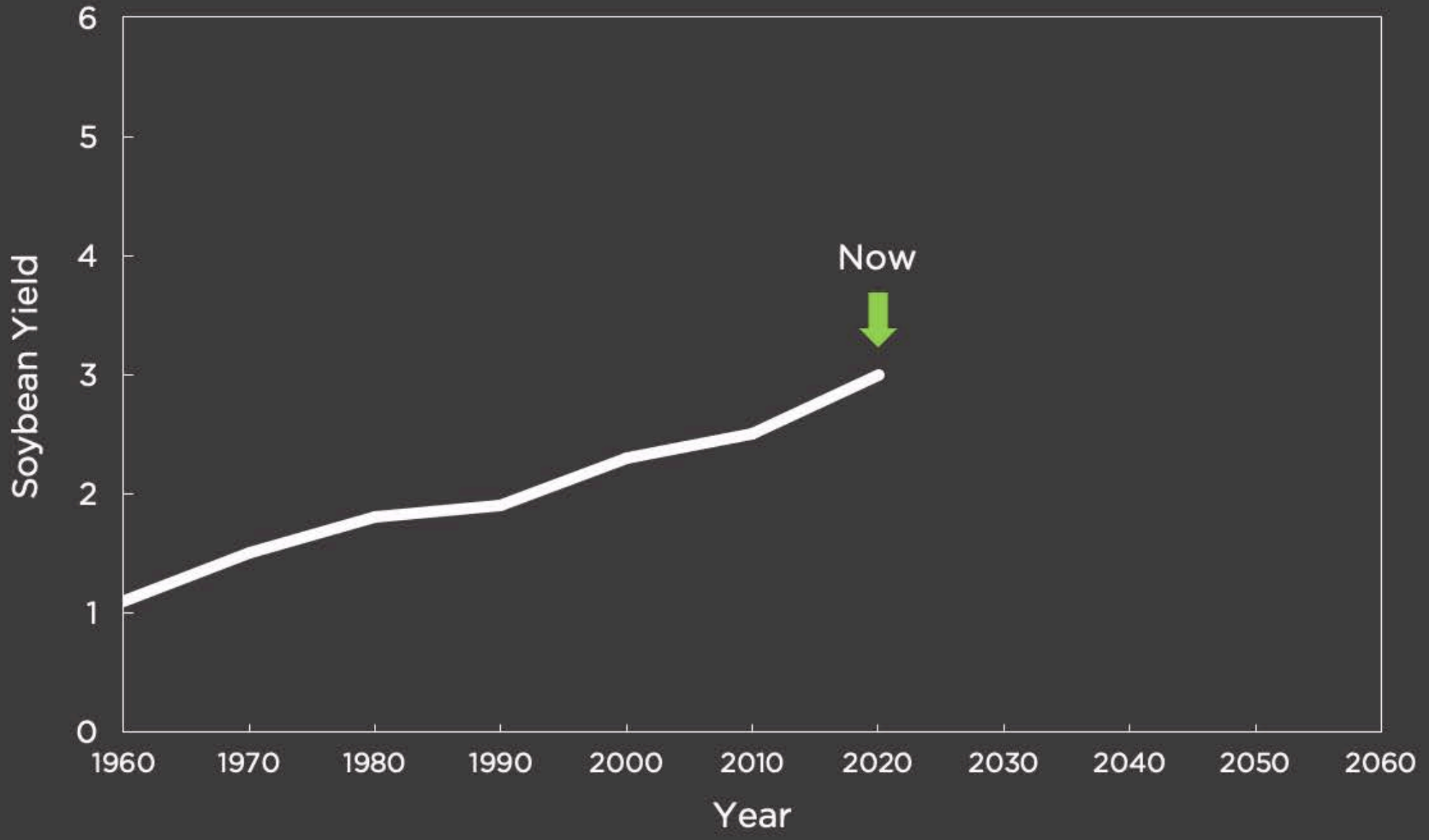
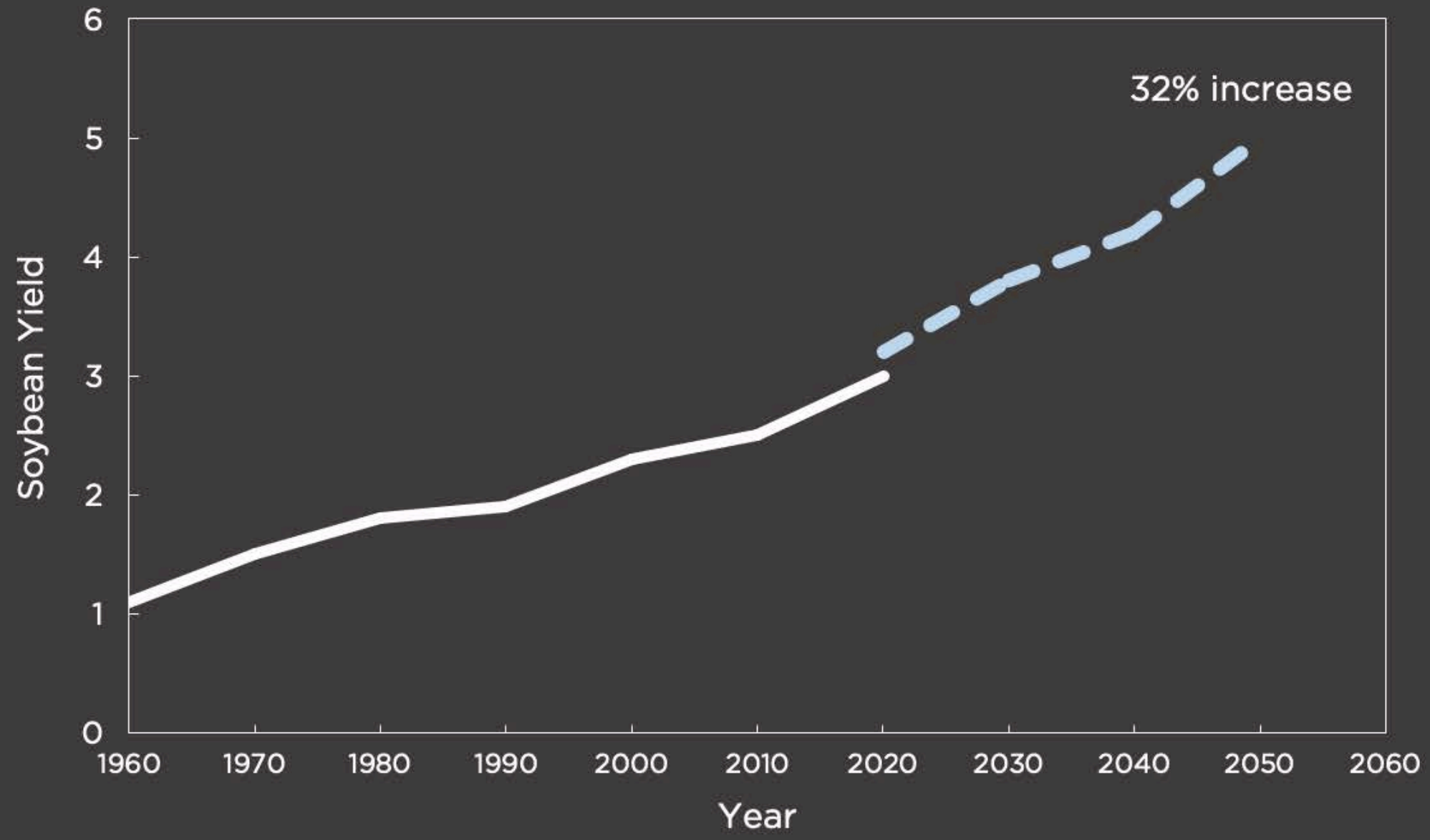
Introduction for MIHI

October 2020

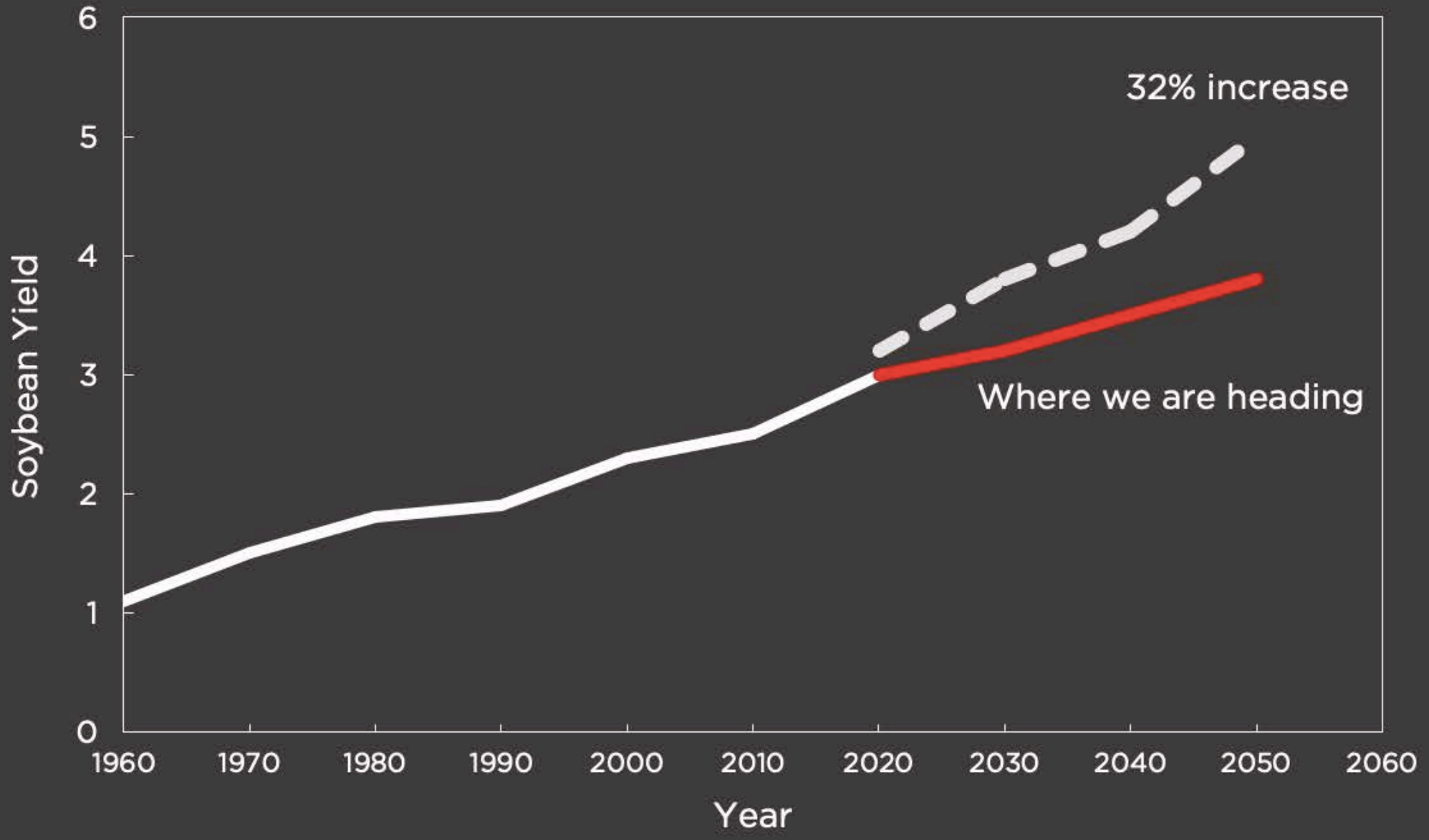
The Challenge: We need to significantly increase global crop yields



The Challenge: We need to significantly increase global crop yields



The Challenge: We need to significantly increase global crop yields



Existing Trait and Crop Protection pipelines are expensive & time-consuming

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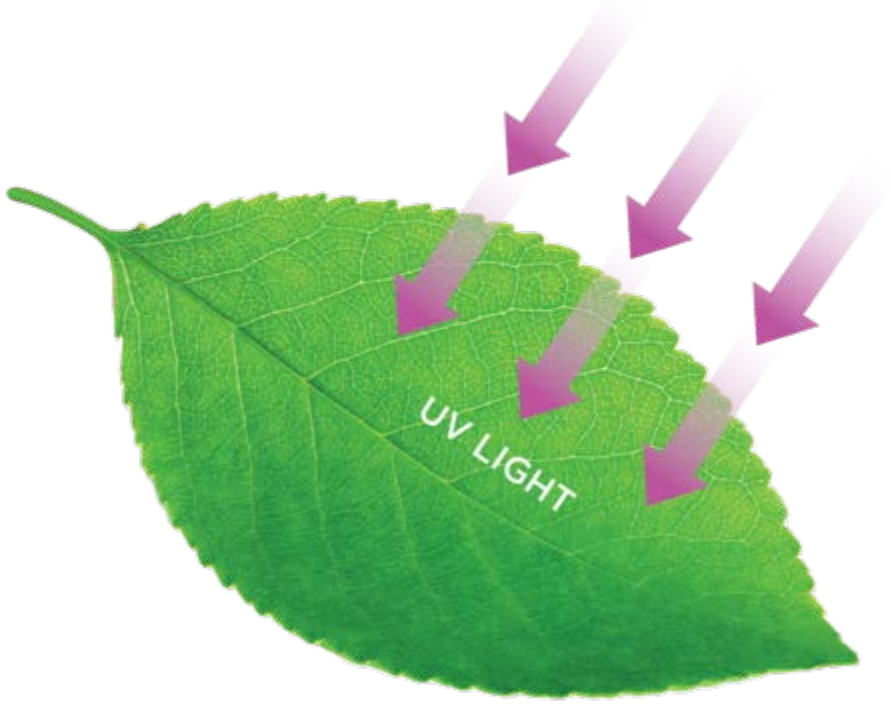
Photogenics is the control of plant UV photobiology

UV light triggers a series of signaling responses inside a plant or seed.

BioLumic's UV Recipes™ exploit these responses to induce agronomically valuable traits, including yield and crop protection gains



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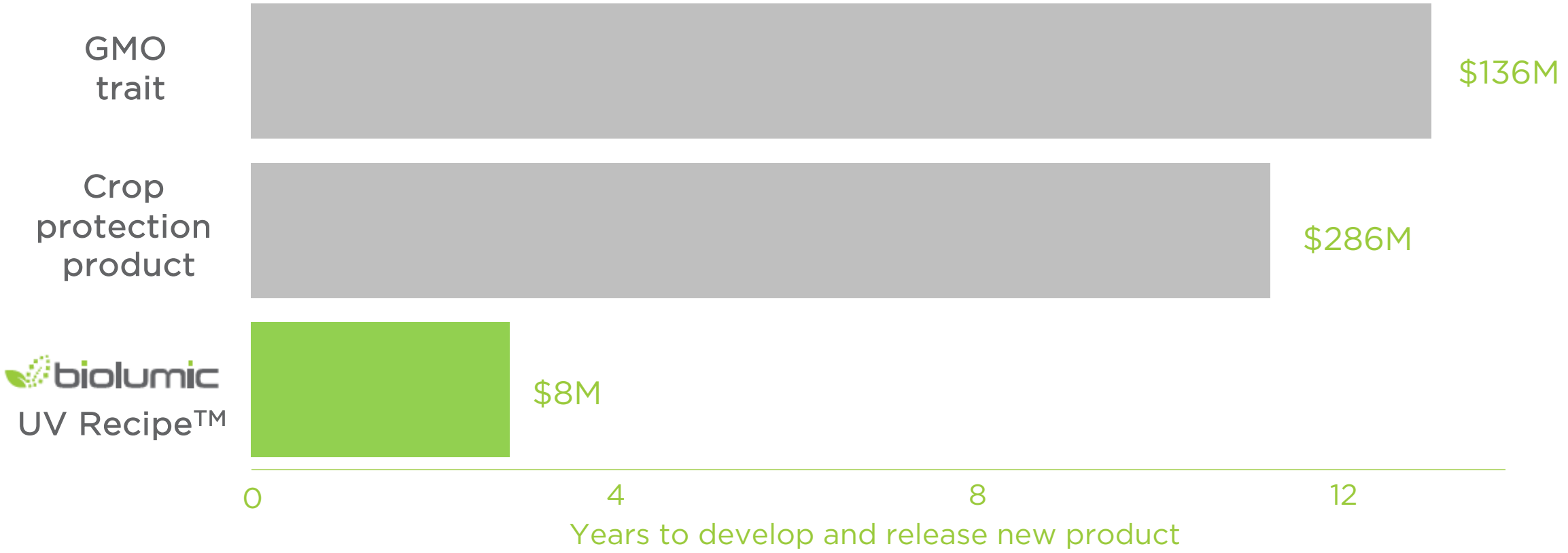
Existing Trait and Crop Protection pipelines are expensive & time-consuming

Biolumic UV recipes™ require 50x less cost and time to develop and commercialize



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Source: Getting a Biotech Crop to Market, Phillips McDougall/CropLife International, 2011

Our technology targets seed and seedling applications

Seed

> Treatment during production stage
> UV Recipes™ Licensed
> Hardware Licensing

Seedling

> Treatment Service [per seedling royalty]
> UV Recipes™ Licensed
> Preproduction plantlet treatments

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Photogenics is a powerful alternative to traditional traits and chemistry

Sustainable

> Non-Chemical
> Non-GMO
> Modulates natural plant signalling pathways
> No materials added to germplasm

Rapid Ag Integration

> Compatible with existing solutions
> Data science to accelerate development
> Rapidly applicable to new cultivars and species

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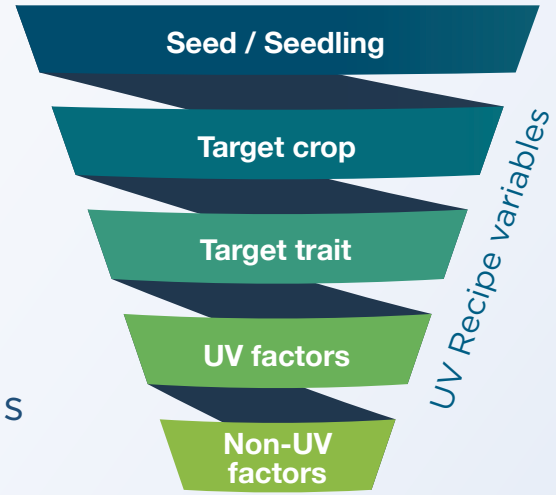
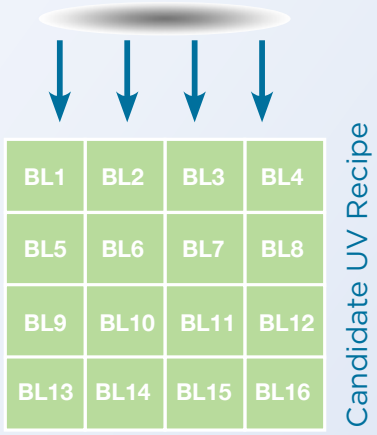
BioLumic Photogenics Platform

1 UV Recipe Prediction

1 thousand trillion potential UV Recipe combinations



Candidate UV Recipe prediction

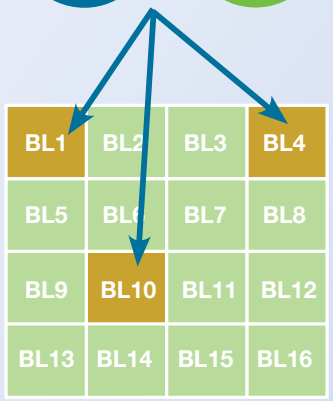


2 UV Recipe Screening

Candidate UV Recipe screening

Gene marker testing

Phenotyping



Trait screening for UV Recipe: crop genetics fit

Yield

Crop protection

3 UV Recipe Application

Integration: Optimize against partner genetics and / or cultivation system

Deliver trait targets with partner co-testing

Recipe licensing for traits and trait packages

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Seedling treatment: Large yield gains

+47% yield increase across whole-of-season
Three commercial cultivars, Hydroponic greenhouse

+32% yield increase in dry flower weight
Indoor production, Clonal propagation

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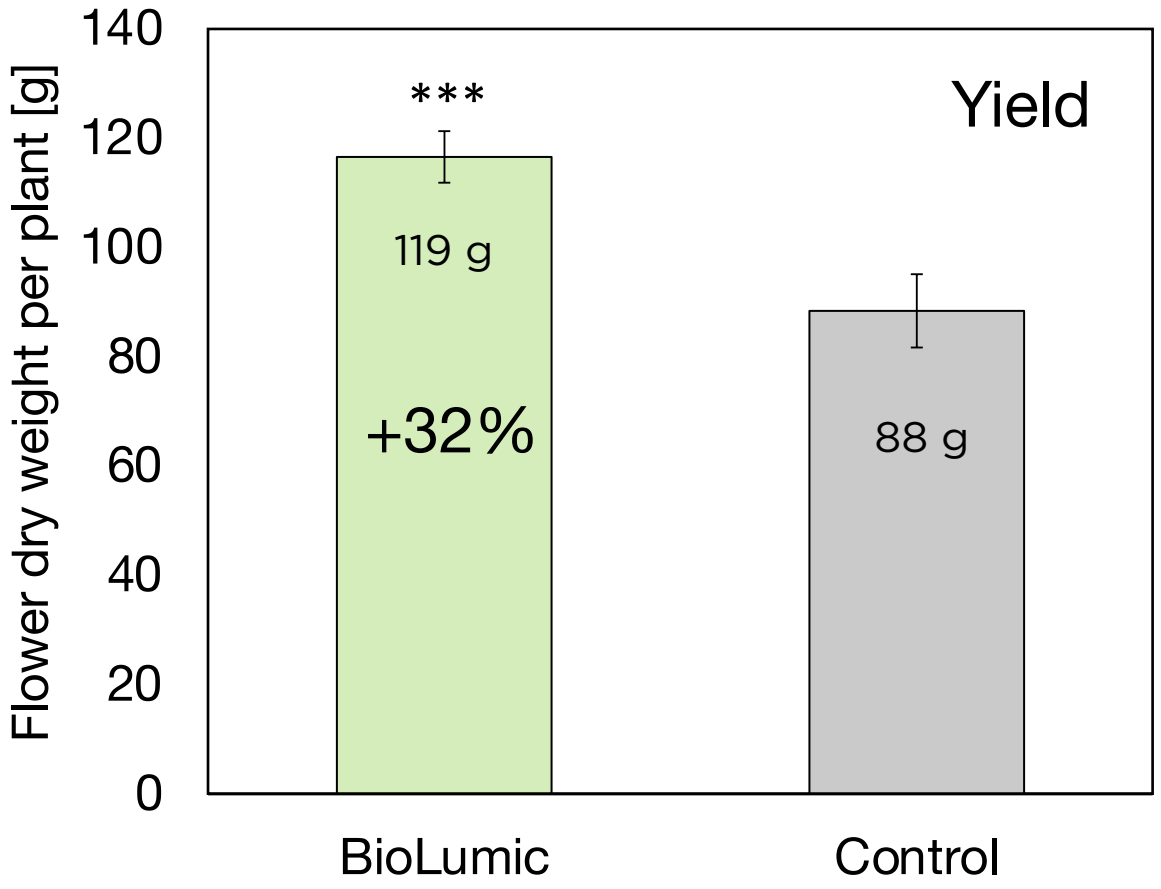
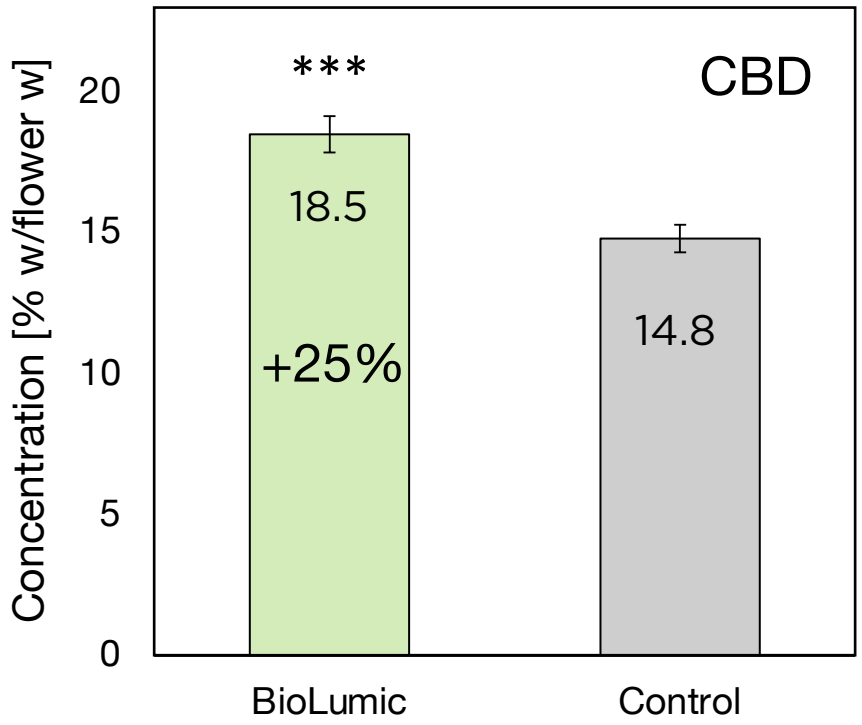
Example outcome – Medicinal Cannabis
Dry flower mass & CBD increased in CBD Kush





Main panel indicates mean flower dry weight for Control or BioLumic treated ['BC2' UV Recipe] plants +/- 1 SE. Means are composed of 5-7 plants per treatment, with asterisks denoting significantly different means at $P<0.01$. Right-hand panel indicates Consistency of plant-to-plant flower mass, calculated as = 1 / SE value [x100]. Clonal cuttings were treated with UV 17 days after cutting. Plants were harvested 109 days after initial clonal cutting date, with harvest maturity set at 85% trichome milkiness. CBD concentration was determined by LCMS analysis by third party service provider.

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Seed treatment: Yield & Crop Protection

+32% yield increase in soybean trials
Numerous commercial cultivars in pipeline

-50% reductions in pest and disease attack in soybean

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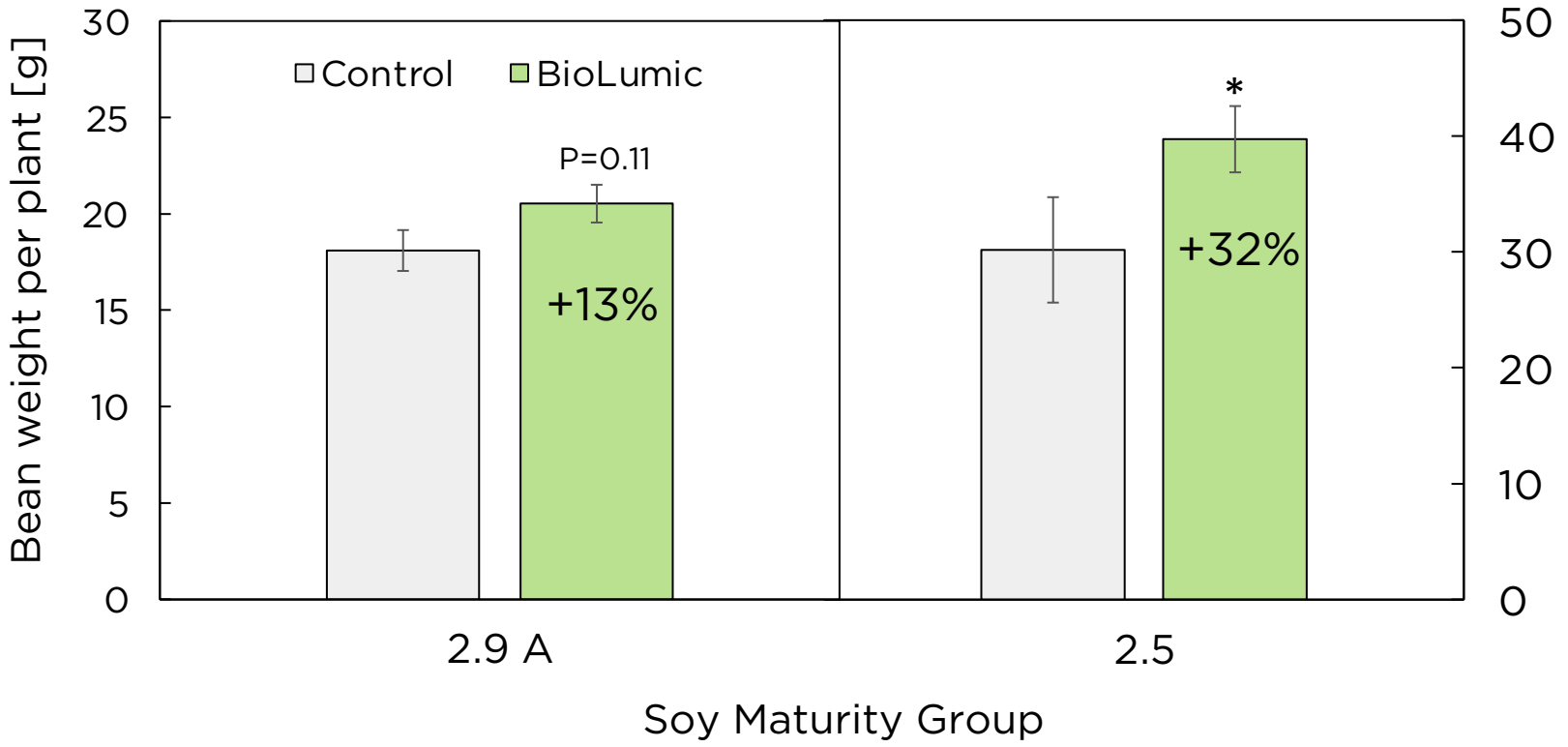
Example outcome – Soybean
BioLumic seed treatments increase Soy yield



R6 stage

Bars indicate mean total soybean seed weight per plant for BioLumic seed-treated or non-treated controls, per soybean Maturity Group. Plants were harvested at R6 soybean stage, following initial seed treatment prior to sowing. Letters next to Maturity Groups denote different varieties of the same MG. Means are typically composed of 10 plants per treatment/MG. Percentage values indicate % increase in BioLumic seed-treated plants, compared to respective controls, with asterisks denoting significance level according to t-test at: *P<0.1.

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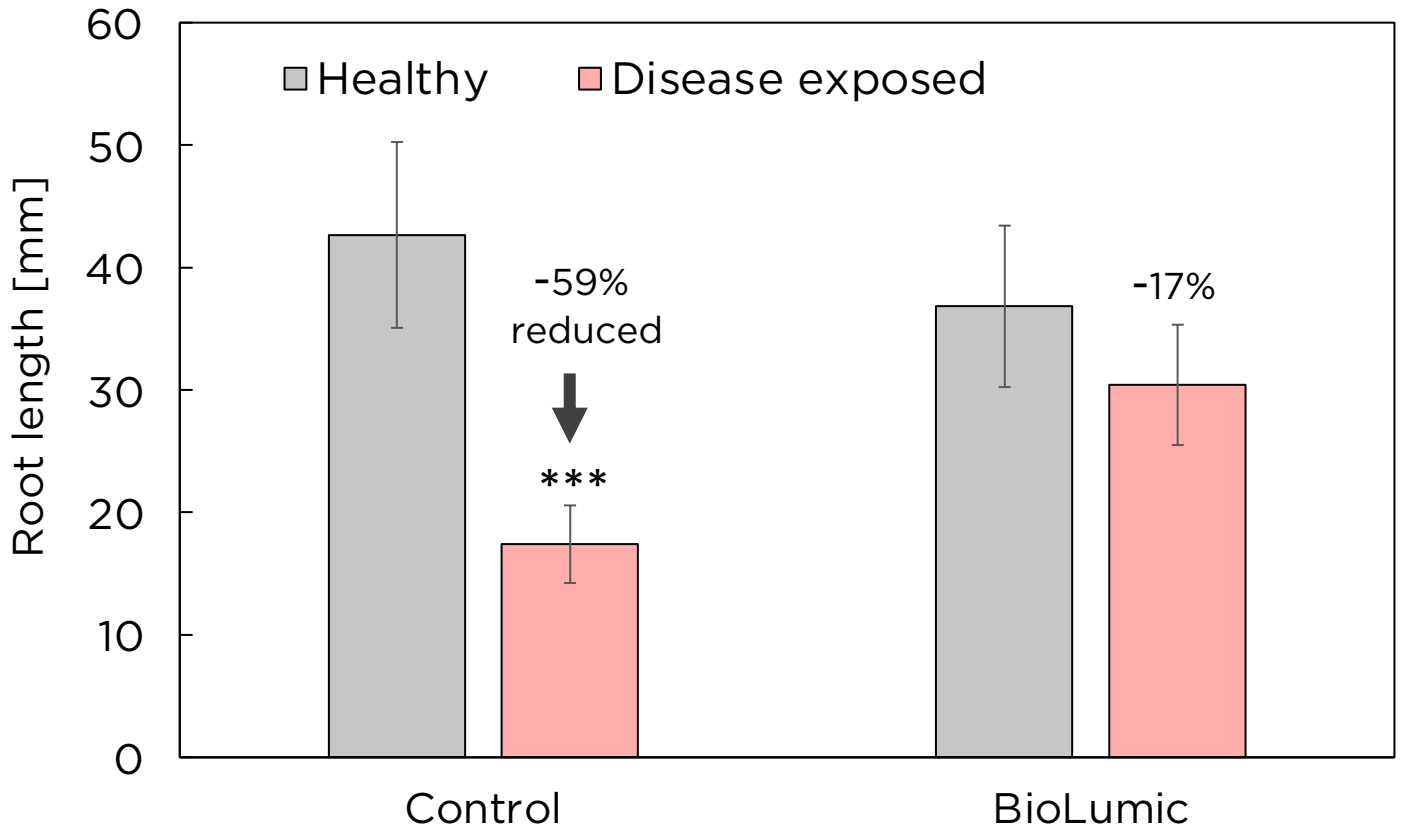
Example outcome – Soybean Crop Protection
BioLumic seed treatments induce disease tolerance



- Soybean root infection assay
- Disease: *Fusarium*
- Normal root growth continues with BioLumic seed treatment

Bars indicate mean root length of soybean seedlings, following inoculation with *Fusarium* ['Disease exposed' = 1uL of 1E4 conidia per ml], or in the absence of inoculation ['Healthy' = sterile water], for BioLumic seed-treated or non-treated controls. Seedlings were assessed at 8 days post-infection, following initial seed treatment prior to sowing. Means are composed of 30-60 seeds per treatment/group, across two experimental repeats. Percentage values indicate % decrease in disease-exposed plants, compared to respective healthy controls, with asterisks denoting significant reduction in disease-infected Control samples, according to t-test at: ***P<0.01.

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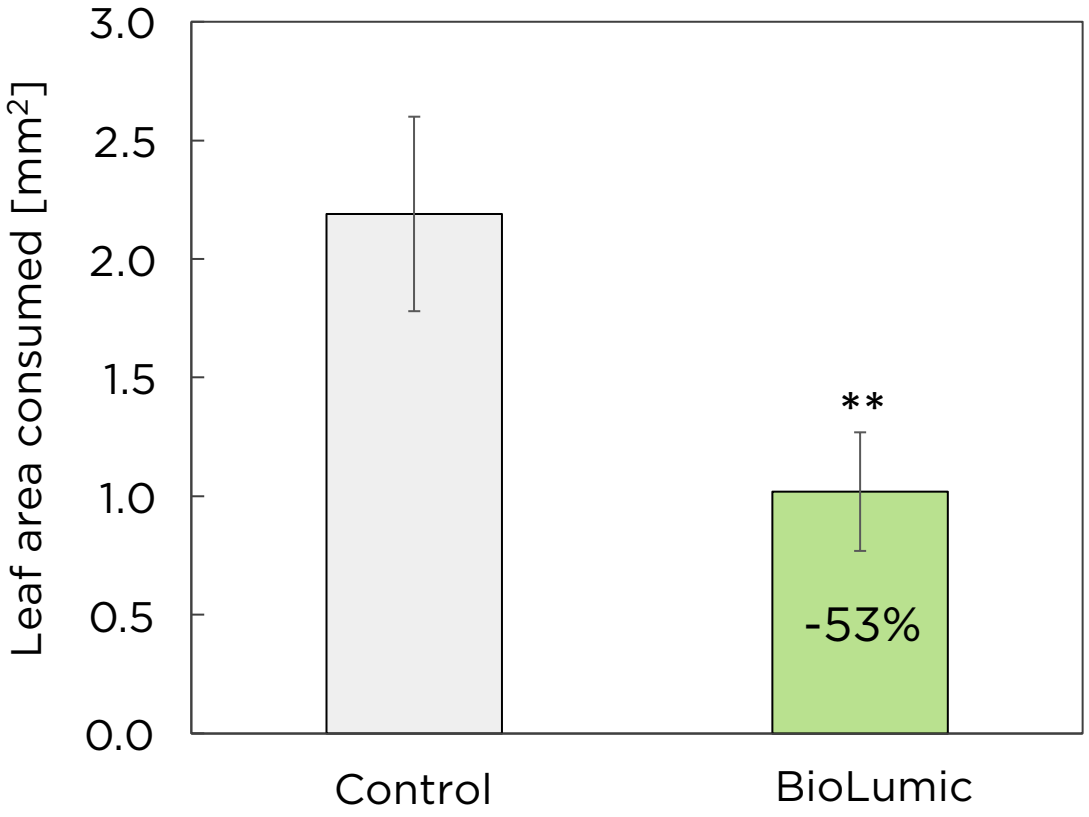
Example outcome – Soybean Crop Protection
BioLumic seed treatments induce insect pest tolerance



- Insect pest leaf feeding assay
- Pest: *Trichoplusia ni*
- Larvae feed less on soybean plants grown from BioLumic-treated seed

Bars indicate mean standardized leaf area consumed by *Trichoplusia* larvae [= mm^2 leaf area eaten per unit caterpillar body weight per unit time], for BioLumic seed-treated or non-treated control plants. Soybean plants across multiple crop cycle stages, were used for clip cage feeding assays, following initial seed treatment prior to sowing. Means are composed of 30 plants per treatment, pooled from three experimental repeats. Percentage value indicates % decrease in insect damage to BioLumic seed-treated plants, compared to respective controls, with asterisks denoting significant reduction in insect damage to BioLumic plants, according to t-test at: **P<0.05.

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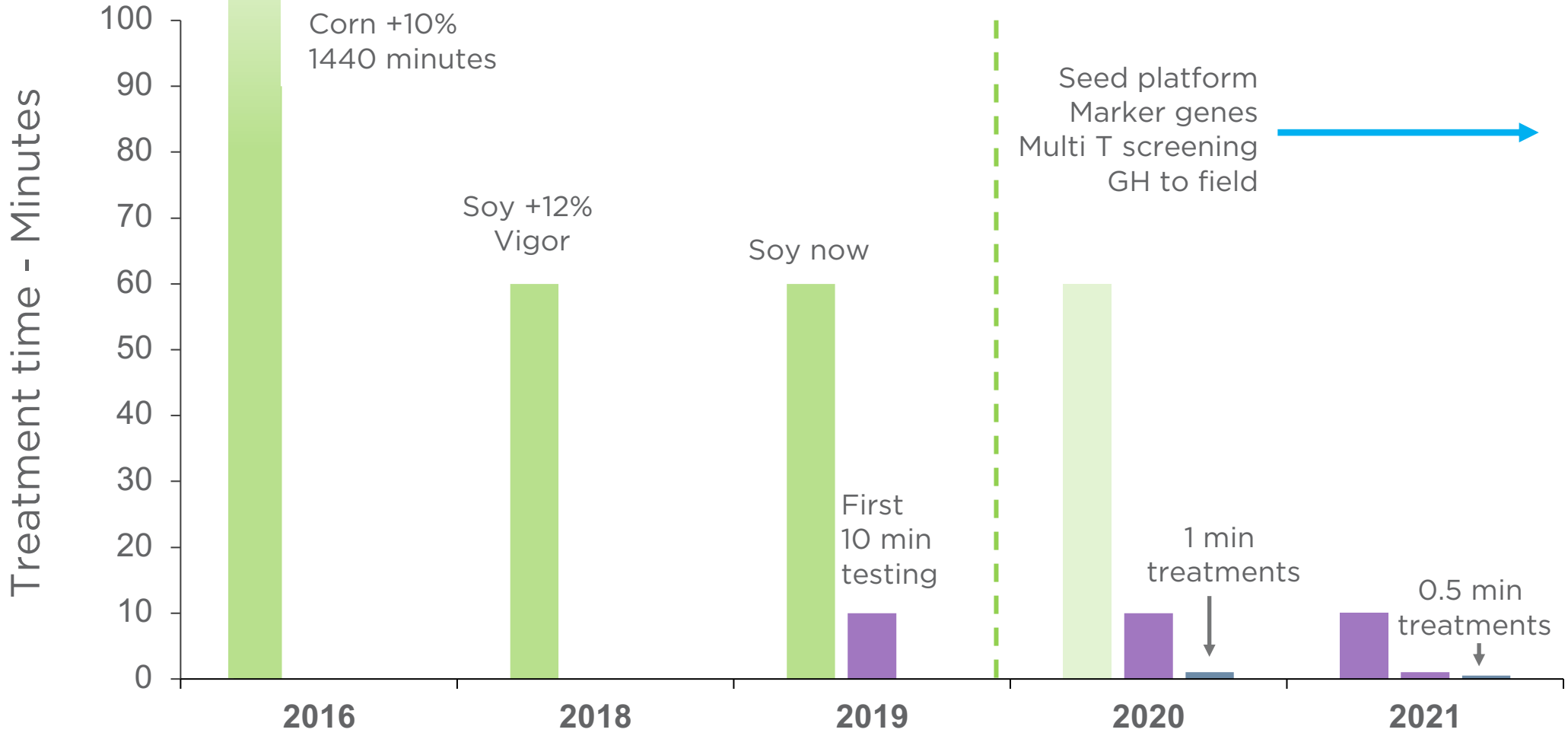
UV Recipe™ seed treatment times are shortening



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BioLumic has a strong IP position

Patent Portfolio

10 Families & 50+ Applications across:

MOA | Method | Device

Trade Secrets

> Detailed UV Recipes™
> Novel modes-of-action

Phenotyping platform

> In-depth phenotypic models and plant signalling knowledge to accelerate recipe development timelines

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IP services provided by
Wilson Sonsini Goodrich & Rosati

Opportunities for Hemp with BioLumic

- BioLumic has already carried out prelim R&D in hemp
- Early results indicated increases in seedling vigour and biomass accrual
- Work paused due to medicinal Cannabis focus
- BioLumic is the programme lead of a 5 year MBIE Partnerships Programme
- The programme offers opportunity for co-investment for development of UV Recipes for ‘new’ crops, e.g. hemp
- BioLumic would welcome a hemp discussion with interested collaborators

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Contact

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