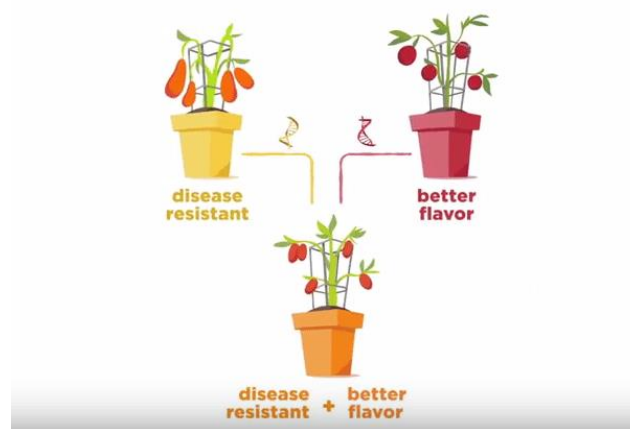


Precision Spectrum for speed breeding

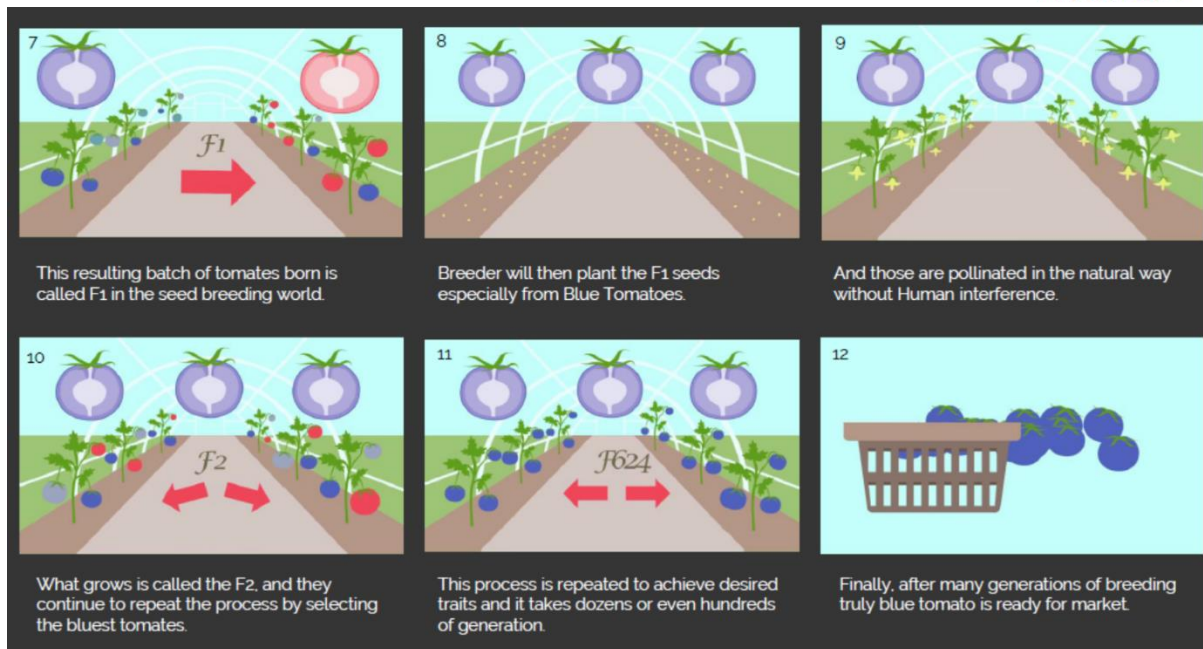
Opportunity and Challenges

Classical plant breeding uses deliberate interbreeding (crossing) of closely or distantly related individuals to produce new crop varieties or lines with desirable properties.

Plants are crossbred to introduce traits/genes from one variety or line into a new genetic background.



<p>1</p> <p><i>s e e d b r e e d i n g</i></p>	<p>2</p>	<p>3</p>
<p>In Breeding, two varieties of the plant are crossed to make one with best traits.</p>	<p>Let's Say, We need to make a consistently blue Tomato.</p>	<p>Blue Tomatoes occur in some wild varieties, but they are not consistent enough.</p>
<p>4</p>	<p>5</p>	<p>6</p>
<p>Seed Breeding take place in Greenhouses to have better control of environment.</p>	<p>Breeders, plant the most blue ones and the other side the successful domesticated variety of tomato.</p>	<p>When they flower, the beeder remove the pollen from one flower and place it in another flower of different variety.</p>



Need

Plant breeding is a slow process.

Developing new kinds of crops with higher yield, more nutritious, drought and disease-resistant –can take a decade or more using traditional breeding techniques.

So plant breeders are working on So plant breeders are working on quickening the pace.

SPEED BREEDING

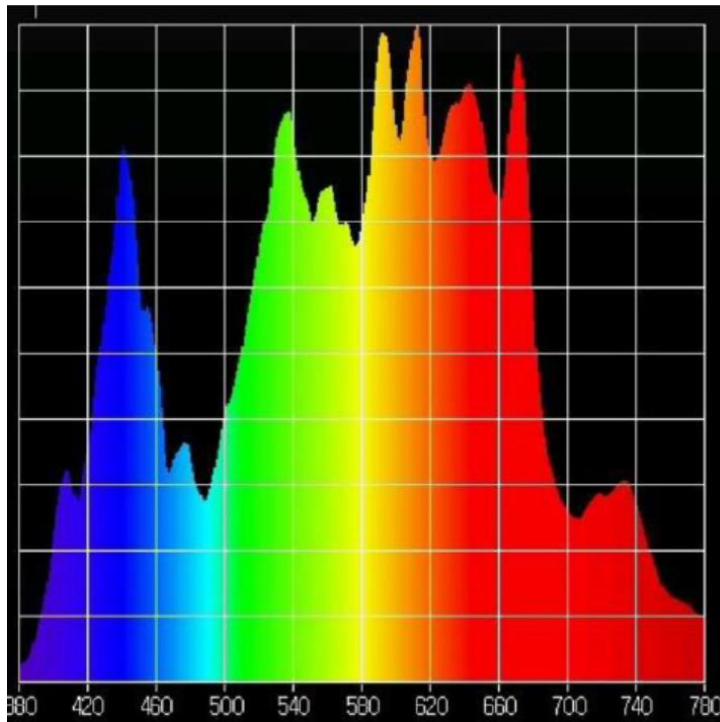
Speed breeding method can be used to achieve up to 5-6 generations per year with a true controlled-environment in the greenhouse or growth chamber. Lighting is one of the most important environmental factors during the growing cycle.



Speed Breeding with Specialized LED Lamps Cuts Crop Growth Time by Half

- the researchers use LED lamps to offer light to the plants for 22 hours per day and provide rich hydroponics nutrient solution to the plants.
- the research team can grow six generations of barley, pea, and chickpea within one year.
- They trick the crops into flowering early by blasting blue and red LED lights for 22 hours a day and keeping temperatures between 62 and 72 degrees Fahrenheit.
- Speed breeding is a powerful tool to accelerate crop research and breeding
- The plants subjected to the speed breeding conditions progressed to the flowering stage in approximately half the time of those in the greenhouse conditions.
- The 22-hour daily photoperiod is achieved by using LED illumination as a supplementary source of light.

Spectral measurement of light composition used for speed breeding



[X-axis values are wavelength in nanometres, Y-axis represents proportion (1 unit = 0.1 proportion)].

Suitable light spectra, particularly with regard to blue/red ratios, red/far-red ratios and the proportional level of UV light that can be introduced for the **crop and trait of interest**.

Innovations in **phenotyping of field-grown crops** can only be combined with **speed breeding for traits** that are stable between the target environment and the conditions used in speed breeding, such as long day lengths and **artificial light spectra**.

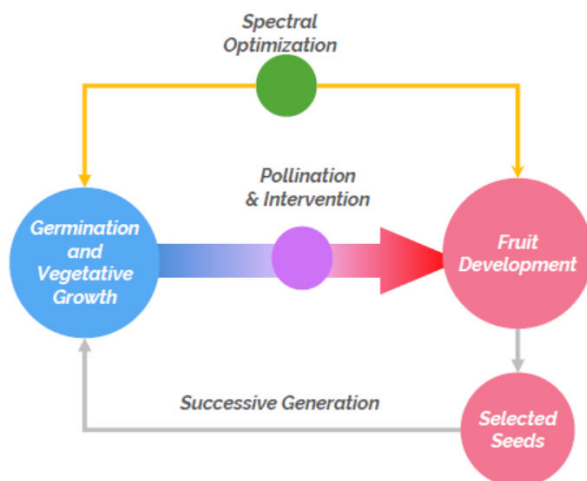
Right light matters

Plants have well established **light sensitive receptor pathways** that respond to specific quality (wavelength) of light and initiate signal cascade to **initiate growth & development transcription programs**. The presence of differential light receptors and genomic diversity implies that the **light effect can be activator(y) or inhibitory to germination & fruiting**.

We are at Nexsel, our research team has developed optimizes lighting protocols for different crops

Plants Breeding -Synergy

The ability of **spectral optimization** to **accelerate growth of plants and faster fruiting and seed production** can have an overall positive and impact on speed and success rate of plant breeding program



Nexsel's solution

For speed breeding we have specialized **grow cabinets** with optimum spectrum and multi spectrum tuneable lighting with temperature and other controls.

For glass housed/ polyhouse, we have developed specialized light with optimum spectrum which best for speed breeding.



Grow Cabinet - for setting protocol for speed breeding



Specialized designed light with optimum spectrum for speed breeding

For right solution be in touch with our technical team.