**Integrating Advanced Speed Breeding Strategies in Pulse Pre-Breeding**

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Speed breeding techniques hold significant promise for expediting the genetic improvement of legume crops crucial for global food security. We have integrated various innovative approaches into our speed breeding pipeline for lentil and chickpea to accelerate plant growth and development.

Deploying embryo rescue techniques to recover immature embryos from cross hybridisations has reduced generation advancement time by up to 4 weeks. Similarly, the application of plant regulatory hormones such as Gibberellic Acid 3 (GA3) encourages flowering and pod maturity to contribute to a shorter breeding cycle and faster generation turnover. Optimisation of nutrient regimes to enhance plant vigour, health and resilience also maximizes flowering and productivity. Our holistic approach to speed breeding has improved chickpea and lentil hybridisation efficiency to more than 50% and 65% respectively, reduced the plant growth cycle by 2-fold and enabled us to achieve fast generation turnover and to complete a single seed descent cycle within 8 weeks (seed to seed).

The integration of these advanced speed breeding techniques offers immense potential to accelerate genetic gain. By shortening breeding cycles, speed breeding – in conjunction with other tools such as genomic selection – facilitates the utilization of untapped genetic diversity to breed more resilient and productive crop varieties.