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INNEXO Cracks the Code: Identifying Cannabis Seed Phenotypes Before They Grow

Non-Destructive Sorting of Seeds Based on Phenotypical Traits

Horst-Meterik, The Netherlands, 3rd march 2025 – For over 40 years, cannabis breeders and cultivators have sought ways to identify a seed's traits before it even sprouts. Now, thanks to groundbreaking advancements in spectral imaging, this vision is becoming a reality.

INNEXO, in collaboration with Innoveins Seed Solutions and SeQso, has successfully completed and validated a proof-of-concept study, elucidating the potential for AI-driven seed sorting to cannabis for the first time ever.

This cutting edge technology, already validated in other high-value crops such as watermelons, sugar beets and tomatoes, has now been adapted to identify and correlate spectral signatures of cannabis seeds with critical traits, including sex, off-types, germination rate and flowering characteristics.

"When we at INNEXO first heard about the validated success of this technology in other crops, we sat out to prove that this could not be translated to cannabis. Because we knew that if it could, the implications for the cannabis industry would be unimaginable. Never was I more excited to be disappointed." - Dominique van Gruisen, CEO of INNEXO

This breakthrough arrives at a critical time for the medical cannabis industry, which is slowly but surely transitioning from clone to seed-based cultivation. Several leading companies have already adopted stable F1 hybrid seeds as a more scalable and cost-effective alternative to cloning. **Advanced sorting technology** will further **improve** the stability and **quality of seeds** entering the market, ensuring that only **genetically uniform, high-performing plants reach commercial cultivation**.

A New Standard for Cannabis Seed Quality

Through **advanced spectral imaging and AI- powered machine learning**, INNEXO and its partners have developed a non-destructive, high-throughput method to analyze and sort cannabis seeds based on genetic and phenotypic traits.

In translating this advanced technology to cannabis seeds, a trained and validated model was used from other crops. Seeds were screened by a spectral camera array on a large data collector. 600 Seeds of 6 different cultivars were digitally labeled, and over 5.000 datapoints were collected per individual seed. The subsequent grow-out was performed under controlled conditions and a variety of traits were meticulously annotated. After statistical modelling of the annotated traits with the spectral dataset, the resulting traits that have sorting viability were identified.

The results of this proof-of-concept show validity for:

1. Germination viability – Identification of the most viable seeds with increased germination vigor.
2. Sex Sorting - Identification of male vs. female seeds, basically eliminating the need for feminization.

3. Off-Type Elimination - Removal of genetic outliers, ensuring only stable and uniform plants are grown.
4. Phenotypic trait selection - Identification of targeted phenotypical traits such as flowering time, flower color, chemotype etc.

This development represents a **significant leap** forward in **cannabis breeding**, providing seed companies with **unprecedented control over genetic consistency** and **market differentiation**.

"At INNEXO we create proprietary sorting algorithms for our clients such as breeders and seed companies. Because every cultivar carries a unique spectral signature, and the techniques we use are non-destructive, proprietary sorting algorithms can be developed for every cultivar in our clients portfolio. Together with our industry leading partners, we can deliver a tailored solution that is accurate, scalable and economically viable. What is even more important: as an industry we don't need to wait ten years to make this technology the new benchmark. We are ready to go." said ***Dominique van Gruisen, CEO of INNEXO****.*

A Collaboration Between Industry Leaders

This breakthrough is the result of strategic cooperation between three highly specialized Dutch R&D companies:

INNEXO – Specializing in molecular farming, with a focus on medical cannabis research, propagation, and cultivation innovations.

Innoveins Seed Solutions – A highly specialized R&D leader in seed phenotyping, spectral fingerprinting, and quality control.

SeQso, part of the DEMCON Group – Experts in high-precision seed sorting technology and equipment, already commercially used in advanced horticulture and vegetable breeding.

"We are beyond excited to be working with trusted partners like INNEXO and Innoveins Seed Solutions, to bring this advanced technology to the fingertips of the reputable breeders and seed companies in the medical cannabis industry." – Twan Boot, Managing Director of SeQso

Shaping the Future of the Cannabis Industry

By integrating **spectral imaging and machine learning**, INNEXO, together with its partners, is paving the way for a **new era in cannabis breeding and seed production**.

With the proof-of-concept now successfully validated, INNEXO is inviting seed companies and breeders to develop proprietary AI sorting algorithms for their cultivars, unlocking new levels of precision in quality control. Together we can write a new chapter in medical cannabis history.

For more information contact INNEXO today.

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About INNEXO

INNEXO is a leading Contract Research Organization (CRO) specializing in molecular farming, cannabis research, and plant-based pharmaceutical innovation. Through premium contract research, product testing, IP development, and operational excellence training, INNEXO is committed to advancing next-generation solutions for molecular farming.