AI is rewiring future of energy crops - Ofer Haviv, CEO, Evogene (EVGN)

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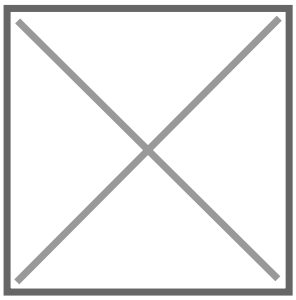

Gene-to-trait mapping and predictive breeding are accelerating the path to high-yield, climate-resilient castor varieties

AgroSpectrum interview, Ofer Haviv, CEO Casterra (subsidiary of Evogene), outlines how castor oil is poised to transition from a niche industrial input to a scalable biofuel feedstock through advances in genetics, mechanization, and precision agronomy. He argues that aligning cost structures with major crops like soybean and palmâ??while avoiding food-versus-fuel conflictsâ??positions castor as a strategic alternative in a tightening regulatory landscape.

Haviv emphasizes Brazilâ??s pivotal role, where castor can function as a second crop alongside soy, improving land efficiency without displacing food production. Looking ahead, he sees castor anchoring a broader bio-based economy,

extending beyond fuels into chemicals and materials as supply scales and costs decline.

From Niche to Scale

Castor oil has traditionally been a high-value, niche industrial feedstockâ??what structural shifts in cost, yield, or demand are necessary to transform it into a globally scalable biofuel solution?

Castor oil has historically occupied a niche position as a high-value industrial feedstock, largely due to limited scalability, fragmented cultivation practices, and relatively high production costs. Transitioning castor into a globally viable biofuel solution requires a fundamental structural shift across the value chain. This includes a significant reduction in cost per ton through yield improvement and large-scale adoption of modern agricultural practices. High-performance hybrid seed genetics must be deployed to ensure uniformity, disease resistance, and yield optimization across diverse geographies.

Alongside this, tailored mechanization solutionsâ??designed specifically for castorâ??s unique plant architectureâ??are critical to reducing dependency on manual labor and increasing operational efficiency. Advanced agronomic expertise, supported by precision agriculture tools and data-driven decision-making, further enhances productivity. Collectively, these shifts can reposition castor from a fragmented specialty crop into a scalable, globally traded commodity suitable for energy markets.

Economics of Biofuel Feedstocks

Given the historically tight margins in biofuels, how does Casterraâ??s model ensure that castor oil can compete economically with established feedstocks like soybean, palm, or corn-based inputs?

The economic viability of biofuel feedstocks has historically been constrained by tight margins and competition with low-cost, high-volume crops such as soybean, palm, and corn. Casterraâ??s model addresses this challenge by integrating advanced genetics with optimized cultivation protocols, thereby lowering production costs and improving yield consistency.

This approach aims to bring castor oil pricing in line with conventional feedstocks, making it a competitive alternative. Importantly, unlike soybean and cornâ??which are edible and subject to increasing regulatory scrutiny due to food-versus-fuel concernsâ??castor is a non-edible crop. Global regulatory trends are increasingly discouraging the use of food crops in biofuel production to safeguard food security and reduce environmental pressures. This regulatory tailwind strengthens castorâ??s positioning as a sustainable and compliant feedstock, enhancing its long-term economic attractiveness in global biofuel markets.

Mechanization Breakthrough

Your trials emphasize mechanized farmingâ??how critical is mechanization in unlocking castorâ??s commercial viability, and what barriers still exist for adoption at scale in emerging markets?

Mechanization is a cornerstone in unlocking the commercial viability of castor cultivation at scale. As agricultural labor becomes increasingly scarce and expensive, reliance on manual harvesting and planting methods is no longer sustainable. Mechanization enables uniform planting, efficient harvesting, and reduced operational costs, all of which are essential for transforming castor into a commodity crop. Casterra has proactively addressed this need by forming strategic partnerships with leading agricultural machinery providers to develop and adapt equipment suited for castor farming.

However, adoption barriers persist, particularly in emerging markets where capital constraints, lack of technical expertise, and limited access to maintenance infrastructure hinder widespread mechanization. To overcome these challenges, scalable solutions such as cooperative farming models, equipment-sharing systems, and service-based mechanization offerings are being explored. These approaches can democratize access to technology and accelerate adoption across smallholder farming communities.

Climate and Land Use Trade-offs

As biofuel demand rises, how do you address concerns around land-use competition between energy crops and food production, particularly in regions like Brazil?

One of the critical concerns in scaling biofuel crops is the potential competition with food production for arable land, especially in major agricultural regions like Brazil. Castor offers a compelling solution through its ability to function as a complementary crop rather than a competing one. It can be cultivated as a second crop following soybean harvest, utilizing residual soil moisture and the tail end of the rainy season.

This dual-cropping system maximizes land productivity without displacing primary food crops. Furthermore, castor has demonstrated agronomic benefits in crop rotation systems, including improved soil health and enhanced soybean yields in subsequent planting cycles. Its relatively low water requirements and adaptability to marginal conditions further reduce pressure on critical resources. As a result, castor not only avoids land-use conflicts but actively contributes to more sustainable and efficient agricultural systems.

AI-Driven Agriculture Meets Energy Transition

How does Evogene Ltd. leverage its ChemPass AI platform to accelerate not just pharmaceutical discovery, but also the development of next-generation agricultural inputs and energy crops?

Evogene Ltd. leverages its proprietary computational platform, ChemPass AI, to accelerate the development of next-generation agricultural inputs and energy crops. This platform enables the precise linkage of genes to desired traits, significantly shortening the breeding cycle and improving the accuracy of trait selection. By utilizing genetic markers and advanced predictive models, Evogene can rapidly develop castor varieties with enhanced yield, stress tolerance, and oil content.

This technological edge not only benefits pharmaceutical and chemical discovery but also plays a pivotal role in advancing sustainable agriculture and energy solutions. The integration of AI into crop development represents a paradigm shift, allowing for faster innovation cycles and more resilient crop systems tailored to evolving environmental and market demands.

Resilience vs. Input Dependency

Casterra highlights low-input cultivationâ??does this position castor as a more resilient crop in an era of volatile fertilizer and energy prices, and could that become its defining competitive advantage?

Castorâ??s agronomic profile positions it as a highly resilient crop in an era marked by volatile input costs, including fertilizers, water, and energy. Unlike many conventional crops, castor can achieve stable yields with relatively low input requirements. It thrives across a wide range of climatic conditions and does not demand intensive irrigation or expensive chemical treatments.

This low-input dependency not only reduces production costs but also minimizes exposure to market fluctuations in agricultural inputs. As sustainability becomes a central criterion in both agriculture and energy sectors, castorâ??s resilience and resource efficiency could emerge as its defining competitive advantages. These characteristics make it particularly suitable for cultivation in regions facing climate variability and resource constraints, further supporting its scalability as a biofuel feedstock.

Commercialization Strategy

With plans to expand in Brazil, what does a successful go-to-market strategy look likeâ??are partnerships with local producers enough, or will vertical integration be necessary to control the value chain?

Casterraâ??s commercialization strategy in Brazil is built on a collaborative ecosystem rather than a vertically integrated model. The company focuses on providing advanced genetics and agronomic know-how while partnering with local farmers and oil crushers to build a robust supply chain. Farmers play a critical role in scaling cultivation, while crushers act as off-takers, ensuring market linkage and processing capacity.

This distributed model allows for rapid expansion without the capital intensity associated with full vertical integration. By fostering strong partnerships across the value chain, Casterra can leverage local expertise, infrastructure, and networks to accelerate adoption. The strategy emphasizes scalability, flexibility, and shared value creation, which are essential for establishing a sustainable and competitive castor oil industry in Brazil and beyond.

Future of Bio-Based Economies

Looking ahead a decade, do you see castor oil primarily as a biofuel feedstock, or as part of a broader shift toward bio-based industrial systems where energy, materials, and chemicals converge?

Looking ahead, the role of castor oil is likely to extend far beyond biofuels, becoming a key component in a broader bio-based industrial ecosystem. As production scales and costs decline, castor oil could serve as a versatile feedstock for a wide range of applications, including bio-based chemicals, advanced materials, lubricants, and specialty polymers.

This convergence of energy, materials, and chemicals reflects a larger transition toward integrated bio-based economies, where renewable biological resources replace fossil-based inputs across multiple industries. If castor achieves the envisioned

scale and cost efficiency, it has the potential to become a foundational crop in this transformation, supporting sustainable industrial growth while reducing environmental impact.

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