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Carbon Nanadot Technology Set to Revolutionise Crop Protection with Sustainable Pesticides

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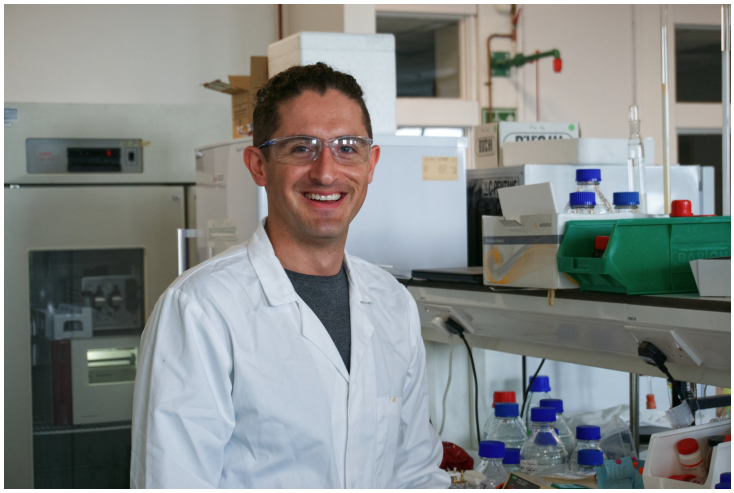

University of Bristol, spin-out CDotBio wins prestigious Armourers & Brasiers Venture Prize

A pioneering carbon nanodot technology, originally developed for healthcare, is now poised to transform global agriculture through the development of next-generation, RNA-based biopesticides. Developed by CDotBio, a biotechnology spin-out from the University of Bristol, UK, this breakthrough promises to reduce reliance on traditional chemical pesticides and significantly lower the environmental impact of crop protection.

CDotBio has been awarded the Â£25,000Â Armourers & Brasiers Venture Prize, which recognises excellence in materials science innovation with high commercial potential.

Carbon nanodots are ultra-small, biodegradable particles that enable precise, species-specific targeting in plants. Traditionally used in medical and biotech applications, these nanodots are now being repurposed to overcome key challenges in RNA-based biopesticidesâ??such as poor stability, delivery, and cellular uptake.

â??Carbon nanodots enhance the stability and delivery of RNA, allowing biopesticides to reach pests or weeds more effectively,â?• said Teo Garcia-Millan, co-founder and CEO of CDotBio. â??They prevent RNA from degrading too quickly, enabling more precise and reliable pest control.â?•

Unlike conventional broad-spectrum chemical pesticides, which often persist in the environment and harm non-target organisms, RNA-based biopesticides offer targeted, biodegradable controlâ??and can even contribute to improved soil health. CDotBioâ??s nanodots are manufactured from renewable organic materials and are cost-effective to scale, making the

solution both sustainable and commercially viable.

â??Eighty percent of global food production depends on plants, yet weâ??re losing up to 40 percent of crop yields to pests and disease,â?• added Garcia-Millan. â??The agricultural sector urgently needs better tools. Our technology unlocks the full potential of RNA-based crop protection.â?•

From Lab to Field: A Commercial Platform for RNA Biopesticides

CDotBioâ??s business model is built on strategic partnerships with agribusinesses, RNA manufacturers, and crop protection firms. The company co-develops targeted biopesticides and generates revenue through licensing, joint development agreements, and royalties. The platform is protected by two patents covering the synthesis and RNA conjugation of carbon nanodots.

The initial target is blackgrass, an herbicide-resistant weed that causes over Â£400 million in losses annually to UK wheat farmers. CDotBio is also developing nanodot-enabled RNA solutions for major crop threats such as wheat rust, downy mildew, aphids, and other insect pests.

Preliminary modelling indicates that nanodot-enabled RNA sprays could reduce synthetic pesticide use by up to 70% in targeted applicationsâ??delivering significant environmental and economic benefits to farmers.

Strong Scientific and Entrepreneurial Foundation

Founded by researchers from the University of Bristolâ??s School of Chemistry and School of Biological Sciences, CDotBio combines cutting-edge nanotechnology and plant science expertise. The companyâ??s leadership includes Dr. Teo Garcia-Millan, a materials chemist with a PhD in functional nanomaterials ; Dr. Veronica Greco, an engineering biologist with a background in genetic circuit design; and Dr. Fran Robson, a plant molecular geneticist with decades of expertise in plant biology and pathology.

The Â£25,000 prize will fund crucial validation studies and field trials ahead of regulatory submission. Field trials are anticipated to begin in 2026, with market launch targeted for 2028, pending regulatory approvals.

â??CDotBio is an excellent example of how UK scientific innovation can drive environmentally friendly solutions in agriculture,â?• said Julian Beare, Chairman of the Armourers & Brasiers Venture Prize judging panel. â??Our mission is to foster scientific entrepreneurship and help promising ventures achieve real-world impact.â?•

Global Vision and Call for Partnerships

With the global pesticide market valued at over $104 billion, CDotBioâ??s platform offers a scalable solution for crop protection across geographies. The company is actively seeking collaboration opportunities with international partners in North America, Europe, and Southeast Asia.

â??We welcome discussions with agri-tech partners, RNA manufacturers, and investors who share our vision for transforming crop protection,â?• said Garcia-Millan. â??CDotBioâ??s nanodot technology is not only an innovation in materials science, it represents a critical leap toward more sustainable, precise, and resilient agriculture.â?•