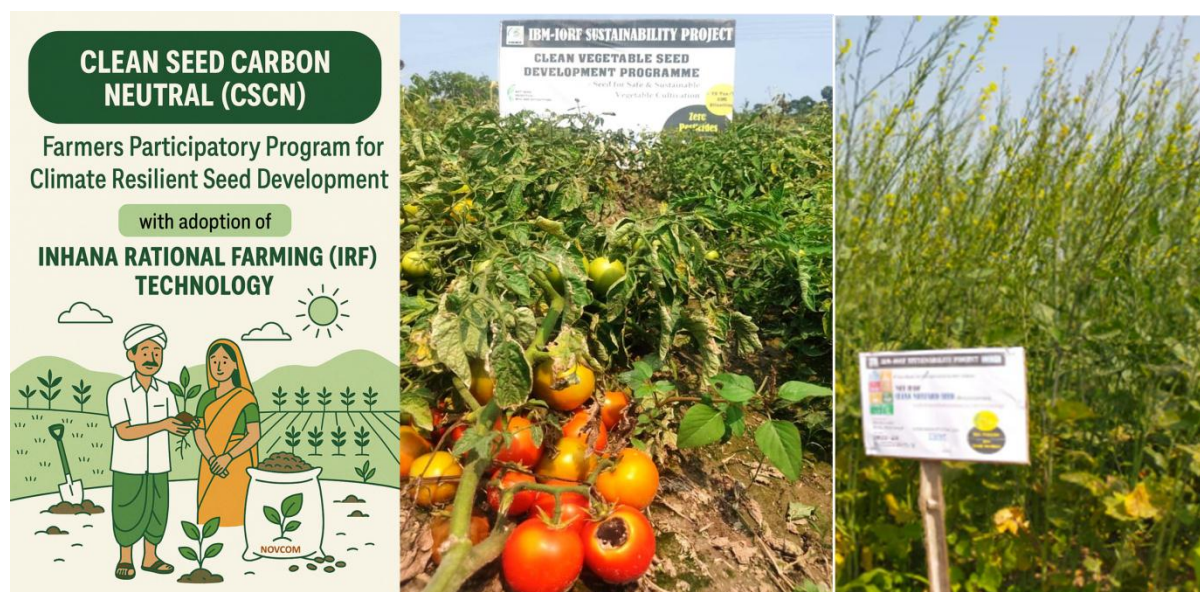


Model 3

Clean Seed Carbon Neutral (CSCN)- Farmers Participatory Program for Climate Resilient Seed Development



The Clean Seed Carbon Neutral (CSCN) model empowers India's smallholder farmers to co-develop and locally multiply climate-adapted, open-pollinated seed varieties through participatory on-farm trials—an approach shown to stabilize yields under heat stress and erratic rainfall compared to conventional seeds. By enforcing Net-Zero Clean Seed standards (zero synthetic fertilizers, pesticides, or growth regulators) and integrating Inhana Rational Farming's plant-health protocols, CSCN enhances seed germination, vigor, and innate immunity, while simultaneously reducing greenhouse-gas emissions in the seed value chain.

Building on successful global and national precedents for farmer-led seed systems—such as India's Farmers' Participatory Seed Production Programme for rapid seed multiplication and community seed banks that conserve local agro-biodiversity along with IORF's own experience in such programs for last one decades with Agricultural Universities, Krishi Bigyan Kendras, ICAR—CSCN establishes decentralized, farmer-managed seed hubs. These hubs deliver hands-on training in organic seed production and rigorous quality testing aligned with national certification standards, ensuring timely access to climate-resilient seeds. By combining regenerative practices with locally adapted germplasm—CSCN not only **boosts yields by 15–20 % under low-input conditions** but also fosters long-term **carbon sequestration (2–5 t CO₂e/ha/year)** and strengthens rural livelihoods through reduced input costs and new market linkages.

Most importantly paddy and vegetable seeds developed under this model in collaboration with Nadia KVK, ICAR showed that the seed quality was found to be well above the stipulated standards for foundation seeds. Comparative quality analysis of conventional seeds vis - a - vis seeds grown under this program was done in respect of three important aspects: **seed viability, seed vigour and seed resilience under abiotic stress** and the test results showed superiority in terms of all the qualitative aspects including seed resilience. Qualitative enhancement of the seeds might be due to the focus on 'Plant Health Management' under IRF technology which energizes the plant system towards enhancement of the plant physiology.











This science based nature harnessed framework directly advances multiple Sustainable Development Goals, including SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 13 (Climate Action), and SDG 15 (Life on Land) by embedding resilience, biodiversity, and carbon neutrality at the seed level

Highlights of Clean Seed Carbon Neutral (CFCN) Model

The key features of the Clean seed Carbon Neutral (CFCN) model, are as follows

Clean Seed Carbon Neutral (CSCN) Model

Key Features of the CSCN Model

 Participatory Variety Development Farmers lead the selection, evaluation, and refinement of indigenous and open-pollinated varieties across their own fields.	 Quality Assurance & Certification Rigorous testing for germination, vigor, genetic purity, and moisture content in line with Indian Seed Certification Standards
 Net-Zero Clean Seed Standards Complete elimination of all synthetic agrochemicals and growth regulators throughout seed production, processing, and storage.	 Agrobiodiversity Conservation Revival and maintenance of traditional landraces and farmer-preferred varieties to safeguard genetic diversity
 IRF-Based Plant Health Management Activation of plant physiological processes (photosynthesis, metabolism, root respiration) for efficient nutrient uptake, systemic immunity, and enhanced seed quality	 Economic Empowerment Reduced dependency on purchased inputs, increased farmer incomes through seed-market linkages
 Climate-Resilient Seed Traits Breeding and on-farm selection for drought tolerance, heat resistance, and pest/disease suppression to stabilize yields under extreme weather	 Capacity Building & Training Hands-on workshops in organic seed production techniques, IRF package of practices, quality control, and sustainable farm management
 Decentralized Seed Hubs Farmer-managed local multiplication centers and community seed banks ensure timely and affordable access to clean	 Carbon Neutrality & Sustainability The CSCN Program promotes carbon neutrality and mitigate GHG in order of 2 to 5 ton CO ₂ e/ha/year by reducing emissions through eco-friendly agricultural technologies.

“The Clean Seed Carbon Neutral (CSCN) model empowers farmers through participatory variety development of indigenous and open-pollinated seeds, operating under net-zero standards that offset synthetic agrochemicals. IRF-based plant health management enhances nutrient uptake, immunity, and seed quality, while climate-resilient traits improve drought, heat, and pest tolerance. Decentralized seed hubs and community banks ensure affordable access, backed by rigorous quality assurance and certification. The model conserves agro-biodiversity, boosts incomes via reduced input dependency and seed-market linkages, and builds capacity through hands-on workshops. Eco-friendly practices mitigate 2–5 t CO₂e/ha/year, achieving carbon neutrality and sustainable agriculture.”