



ICRISAT

Smart protein



Background

- There is a rise in global demand for plant-based proteins. The reported association of dairy and animal protein with cardiovascular disease, type 2 diabetes, colorectal cancer, and mortality has led to a large section of consumers switching to plant-based proteins.
- Non-meat, vegan, dairy-free, vegetarian, and ethical food systems are also in high demand.
- Protein-energy malnutrition is a major public health problem which costs the global economy a GDP loss of up to **16%**, about **US\$ 3.5 trillion** a year.
- The global protein ingredient market was valued at US\$ 38 billion in 2019 and is expected to grow at a rate of **9.1%** from 2020 to 2027.

These compelling factors require strengthening and expanding the development and delivery pipeline for quality plant-based protein for the industry and consumers globally.



ICRISAT's Capability

- With the failure of soy protein due to allergenic and estrogenic effects and pea protein being the major source of plant-protein, climate-resilient pulses of the drylands such as pigeonpea and chickpea can be a more affordable high-quality protein source. These crops have a huge scope to meet the increasing demand of plant-based protein.
- ICRISAT is home to the world's largest and most diverse collection of **pigeonpea (13,783)** and **chickpea (20,764)** germplasm. It also breeds protein-rich new varieties in addition to potential genomic interventions for improving protein quality and bioavailability.
- Pigeonpea and chickpea have the potential to provide **28-30%** of protein containing high amounts of essential amino acids such as lysine, leucine, arginine, and other amino acids such as aspartic acid and glutamic acid.



- ICRISAT has also initiated a dedicated program on mainstreaming millets along with pulses into the “alternative protein” segment. Incorporation of millets into texturized vegetable protein formulations result in superior textural properties of plant-based meat analogues, in addition to improving nutritional properties.



The Way Forward

ICRISAT has 50 years of experience working with a diverse range of partners to deliver improved breeding lines with market-preferred traits. ICRISAT together with its partners would like to further scale efforts to:

- develop improved chickpea and pigeonpea varieties with a high protein content
- assess and improve digestibility, bioavailability and functional properties meeting industry demand
- develop innovative “Smart protein” ingredients to be used by the food industry from pulses
- develop, validate and commercialize “Smart protein” based value-added food products using pulses
- deliver innovations for value chain development and assess the potential impact on the sustainability of agriculture and human health.