
Agriculture research in India: what is and what should be

Agriculture research in India is still dominated by the Green Revolution's philosophy and goals, argues **Suman Sahai**. Increasing production of the major staple crops continues to claim centre stage and the bulk of the agriculture research budget.

The annual budget of the Indian Council of Agricultural Research (ICAR), India's leading agency for agricultural research is not insubstantial: for the year 2014-15 it was Rs 61.45 billion.¹ Of this, the bulk (about 20%) was devoted to crop sciences, 11% to animal science and eight percent to horticulture. Strategic and frontier application research on the other hand, got less than two percent. This reflects a lack of focus on research to prepare for the current and future challenges facing farming and farmers. This is surprising given that India is already confronting climate change in real time and feeling its brunt every year in unseasonal rains, deficient monsoons and unpredictable droughts and floods, leading to shortfalls in total food output. Although natural resource management (e.g. for soil and water) got approximately 12% of the budget in 2014-15, the approaches are conventional, for instance using chemical fertilisers to 'improve' soil health.

The real problem however is the traditional patriarchal approach to determining what's good for agriculture and farmers. Decision-making is top down, with almost no consultation with farmers and other stakeholders on their needs, the problems they need solved or their options for diversification. Formulae are worked up in scientific institutions to solve this or the other problem or achieve this or the other goal. Underlying all this planning is the sole commitment to increasing production.

On the other hand, farming has

undergone dramatic changes on the ground, like the widespread feminisation of agriculture. Faced with declining returns from farming, men migrate to cities for better opportunities. Yet this enormous shift finds no resonance in setting research priorities even though it's recognised that women farm differently. Then there is the withdrawal of the agriculture extension service that linked farmers to scientists, which means there is now no communication between the two. Previously, the extension service would pick up problems in the field, such as when a successful variety was failing or a new pest had appeared. This feedback informed research which then sought a solution. This is no longer the case.

The adoption of Genetically Modified (GM) technology is a good example of how research agendas are moving further away from farm needs. Critics have often said that GM crops were a "solution looking for a problem". Farmers were never consulted about the need for GM crops, nor were the pros and cons discussed with them. Some fifteen years after Bt cotton was adopted, farmers are still not fully aware of what this technology really does. The mandatory insect refuges are still not being planted and the number of pesticide sprays have not always come down. As for the research itself, regulatory violations are commonplace.²

Although exact figures are not available for the money channelled to GM research, there are indications that it takes a substantial amount of the research funds. According to the Department

of Science and Technology, a number of public sector research institutes, 51 universities, 118 research institutions and 64 agri-based industries were engaged in research on more than twenty GM crops.³

Transparency in research, especially on GMOs, is a serious challenge as both public and private sector institutions are reluctant to provide information. In 2006 Gene Campaign requested the biosafety data generated on Bt brinjal, under the Right to Information Act.⁴ The Government refused, saying the data was 'Confidential Business Information'. Gene Campaign had to seek the intervention of the Supreme Court, arguing that information with a bearing on public health could not be considered 'confidential'. The Court then instructed the Government to make such data available in the public domain.

Defining research programmes for coping with climate change demonstrates yet again that the research establishment works on its own, without consulting stakeholders. The National Mission for Sustainable Agriculture (NMSA) is one of eight Missions set up by the Government's National Action Plan on Climate Change (NAPCC) in 2008.⁵ NMSA's Research and Action Plan provides no information on the methodology adopted for identifying the priority areas for research, nor does it mention the persons involved in developing the agenda. The document reiterates positions taken decades ago. For instance, on rainfed farming, the NMSA's sole approach is watershed development, a position that the

Government took about 70 years ago when it adopted the National Watershed Development Programme for Rainfed Areas (NWDPA).⁶

The NMSA looks to biotechnology to address the multiple problems of climate change, even though India's sole GM crop is Bt cotton and its research is restricted to insect resistance via the Bt route, and to herbicide tolerance. Curiously, genetic diversity, widely recognised to be an effective tool in global efforts to counter climate change⁷, receives scant attention. Yet India is a powerhouse of agrobiodiversity and could provide real solutions to coping with drought, submergence, salinity, temperature rise and new pest profiles.

Stakeholder inputs can bring new ideas, new approaches and out of the box thinking informed by practical field experience. But the Indian research establishment continues to turn its back on this advantage. Likewise, it fails to take seriously or build on agriculture-related research conducted informally by farmers and civil society groups.

Stakeholders continue to use diverse platforms to speak up about what they would like agricultural research to address. Below are the recommendations that emerged from two national consultations organised by Gene Campaign on identifying current research needs and improving farming. In a 2010 national conference on 'Ensuring Food Security in a Changing Climate'⁸, priority areas for climate adaptation research emerged from consultations with a range of experts and practitioners from 22 States.

Specific recommendations

A knowledge-intensive, not input-intensive approach should be adopted to develop sustainable farming systems. Traditional knowledge about farming and coping with adverse weather should be incorporated into research programmes to address the uncertainties of climate change, build resilience and reduce emissions.

A special research focus is needed for rain fed areas and a diversified model including crops, livestock, fisheries, poultry and agro forestry should be developed to minimise risk.

A Centre for Climate Risk Research,

Management and Extension must be set up in each of the 128 agro-ecological zones. The Centre should prepare computer simulation models of weather probabilities and develop farming system approaches to minimise the adverse impact of unfavourable weather and maximise the benefits of a good monsoon. Field research stations must house dynamic research and training programmes on building soil health, pest management, water conservation and the equitable and efficient use of natural resources.

Genetic evaluation of traditional varieties and animal breeds must be undertaken to identify valuable traits for future breeding, including tolerance to higher temperatures, drought and salinity; as well as feed conversion efficiency and disease resistance in animals.

Participatory and formal plant breeding must be promoted to develop climate resilient crops that are temperature, drought and salinity tolerant.

In crops, genotypes with a higher per-day-yield potential must be selected, to counter the yield loss from heat induced reduction over the growing period.

Developing balanced ration, feed and fodder regimes are required that will increase milk yield of indigenous cattle and reduce methane emissions.

In another national consultation to celebrate its 20th anniversary in 2013, Gene Campaign brought together scientists, civil society groups, farmers, policy makers and media professionals to discuss what was needed to make farming profitable and farmers prosperous. These deliberations yielded a wealth of suggestions⁹, some of which are flagged below:

Farming's goal cannot now be the maximisation of yield (as in the Green Revolution model of high yield at all cost). Minimising risk is crucial in today's era of climate turbulence. Minimising damage to the natural resource base is key.

Map local resources and crop and animal genetic diversity; develop local resource based farming systems.

Develop region specific sustainable farming systems to exploit the genetic potential of existing varieties rather than breed new ones.

Develop gender appropriate farm

equipment and instruments for use by women, given the widespread feminisation of agriculture. Most farm equipment is designed for men, which physically smaller women find hard to use.

Move away from exclusive subsidies to chemical fertilisers. Create financial structures to subsidise farmer initiatives that improve soil health using different composts and organic matter.

Develop early warning systems for timely detection of new pests, which climate change is bringing in to new areas. Data on pest types should be compiled and shared with farmers, along with training on the best approach to control specific pests. An Integrated Pest Management programme incorporating traditional community knowledge of pest detection and control should be developed.

Focus research on developing true breeding seeds rather than hybrids. Private seed companies and public-private research collaborations tend to develop hybrids which serve as an intellectual property instrument without necessarily benefitting the farmer.

There was consensus that an effective extension system must be restored, including both education and responsive research to fix field problems.

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 - 8 Gene Campaign (2010) National Conference on Ensuring Food Security in a Changing Climate, 23- 24 April, 2010 New Delhi [link]
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