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Conservation, Management and use of Agrobiodiversity

NAAS

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Conservation, Management and Use of Agrobiodiversity

The National Academy of Agricultural Sciences (NAAS), in collaboration with the National Bureau of Plant Genetic Resources (NBPGR) organised a workshop on 'National Concern for Conservation, Management, and Use of Agricultural Biodiversity', commonly referred to as 'agrobiodiversity'.*

It was the first systematic, country-level effort to deliberate on issues related to the recognition of 'agrobiodiversity' as an entity distinct from overall biodiversity and the priority areas needing urgent attention. The theme was considered important, in view of the recent global developments which have far-reaching consequences on policies, legislative measures and the action plans of developing countries, rich in genetic resources.

The workshop was arranged in four technical sessions, namely, (i) sustainable and equitable use of agrobiodiversity, (ii) assessment of diversity and infrastructural needs, (iii) eco-development concerns in natural *versus* agro-farming systems, and (iv) entitlement and mode of compensation to beneficiaries of benefits derived from PGR use/ IPR. Perception about each theme was introduced through invited presentations and was followed by brainstorming, open-house discussions and consensus building. The salient recommendations emerging from this exercise are presented here for wide circulation among the stakeholders and for follow-up action.

The Backdrop

Several international developments relating to genetic resources that influence national policy development, include the Convention on Biological Diversity (CBD), the Conference of Parties (COP), the Subsidiary Body for Scientific, Technical and Technological Matters (SBSTTA), the FAO Commission on Genetic Resources for Food and Agriculture (CGRFA), the revision of International Undertaking on Plant Genetic Resources, the Global Plan of Action (GPA), the Trade Related Intellectual Property Rights (TRIPS) in the General Agreement on Tariffs and Trade (GATT/WTO) and the Sanitary and Phytosanitary Agreements (SPS) in the World Trade Organization (WTO). These developments have affected the intellectual property regime, the access to biological resources, the equitable sharing of benefits accrued from use of genetic resources and several other related issues. In India, measures taken to cope up with the emerging situation, include drafting of a Plant Variety Protection (PVP) and Farmers' Rights Act, a Biological Diversity Act and the formulation of a National Action Plan for implementation.

The CBD's Conference of Parties (COP-III) decision** in November 1996, to grant specific recognition to agrobiodiversity requires urgent follow-up by all countries. In India,

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* *The two-day workshop held at the Central Potato Research Institute, Shimla, 15-16 October 1997, was attended by over 125 scientists and experts, members of governmental and non-governmental organisations, representatives of agricultural universities and a broad range of other stakeholders.*

** *.....in order to facilitate an integrated approach to agricultural biodiversity (Resolution 3/95 FAO Conference), the CBD welcomed the interest of the Commission...*

Further reference was made to decision 111/11, whereby the COP encourages Parties to develop national strategies, programmes and policies for conservation and sustainable use of agricultural biological diversity, according to 14 action-oriented goals...

serious concern has been expressed about the deteriorating condition of the nation's agrobiodiversity and a variety of suggestions have been advanced for policy refinement and action. The need to analyse relevant factors and refining workable solutions in the Indian context has been stressed. The workshop carried these ideas forward to develop appropriate policies and evolve mechanisms for implementing action plan on conservation, management and use of our agrobiodiversity.

Agrobiodiversity

Agrobiodiversity occupies a unique place within biodiversity. It recognises that agriculture evolved from bioprospecting, selection and development of a few species from plant and animal kingdoms, to meet human needs of food, fibre and fuel. All biotic factors related to agriculture, such as, plants, animals, fish, reptiles, insects, birds and microbes are components of agrobiodiversity. The conservation, management and sustainable use of these organisms (and their wild progenitors/relatives) require specific attention.

The CBD recognised the global need to conserve and manage the biological diversity existing on this planet. Subsequently, in the COP decisions 111/11 and 111/15, the CBD gave specific recognition to agrobiodiversity in conformity with Resolution 3/95 of the FAO Conference (q.v.). It is obvious that humankind is concerned *inter alia* with phenomena like global warming and environmental pollution, which the CBD intends to handle through effective management of biological resources. It is also recognised that biological resources related to food and agriculture need to be managed with added care in future so as to meet the demands of increasing global population.

The COP-III observed that various policies, legislative measures and action plans on biological diversity will have a bias towards environmental/forestry/total bioresources related issues at the cost of agrobiodiversity.[*] It hence recommended that the latter must receive adequate attention by the member nations in their developmental plans. Global attention was also drawn to the need of ensuring partnership among all stakeholders for initiating conservation activities and ensuring access to these resources both for equity and benefit sharing.

India: A Rich Culture of Agrobiodiversity

The Indian gene centre is among the 12 megadiversity regions of the world. About 25 crop species were domesticated here. It is known to have more than 18,000 species of

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In this regard, it was noted that there is a need for appropriate mechanisms at the national level to ensure that agricultural biodiversity activities and plans will be effectively integrated into the national biodiversity strategies, plans or programmes that Parties have requested to prepare, and report on to COP-IV, as a priority activity in line with Article 6 of the Convention.

(Source: FAO Document, CGRFA-7/97/Rep).

[*] *It was noted that the CBDs' and GEFs' focal points tend to be located in the ministries responsible for environment while the focal points for programmes and plans in the agricultural sectors tend to be located in the ministries of agriculture. In accordance with decision 111/11 of the COP and the recommendations of the GPA, it was noted that there is a need for liaison between the different focal points and government departments with a view to developing effective integrated approaches for the conservation of agricultural biodiversity.*

(Source: FAO Document, CGRFA-7/97/Rep)

higher plants including, 160 major and minor crop species and 325 of their wild relatives. Around 1,500 wild edible plant species are widely exploited by native tribes. These include, 145 species of roots and tubers, 521 of leafy vegetables/greens, 101 of buds and flowers, 647 of fruits and 118 of seeds and nuts. In addition, nearly 9,500 plant species of ethnobotanical uses have been reported from the country, of which around 7,500 are for ethnomedicinal purposes and 3,900 are multipurpose/edible species.

The traditional farming systems of India are relatively stable and in equilibrium. The species complexes in traditional farming systems exemplify coexistence of plants and human tribes, draught animals, friendly birds, beneficial insects, pollinators, earthworms, soil microorganisms and biocontrol agents. Modern farming systems, which evolved in response to the growing needs of the human society to ensure food and nutritional security have progressively replaced traditional agriculture. More than half of the cultivated area under major crops is now covered by improved varieties and farming practices. Biotic diversity is maintained in modern agricultural systems primarily through cultivation of 'mosaic of improved varieties'. It is important that diversity is assured while attaining high production levels and profitability.

A combination of *ex situ* and *in situ* conservation approaches is required for agrobiodiversity conservation strategies in the Indian gene centre. The efforts of the Indian Council of Agricultural Research (ICAR) are exemplary, yet there is a long way to go. Fortunately, the country is well endowed with local resources and expertise and is open to international collaboration and exchange. Good progress has been made in past years in institution building and human resource development (HRD) on PGR. The largest gene bank in the world for *ex situ* conservation has been set up at NBPGR, New Delhi. It will be prudent to recognise this facility as our national heritage with needed support for its sustainability. Efforts need to be continued to strengthen and consolidate similar initiatives in the public sector.

Human tribes, particularly women, have a long tradition of preserving plant species and the agroecosystems. There is a need to preserve the traditional practices and learn from the available local wisdom. Some of the vital issues of contemporary diaiogue on genetic resources are not new to the Indian society but these need to be revisited. Benefit sharing and the entitlement of beneficiaries are among the important issues that need better definition and implementation mechanisms.

Resolution: The importance of agrobiodiversity must be recognised as distinct national issue of prime concern within the broader area of biodiversity.

Recommendations

National Action Plan

1. High priority should be given to developing a sound and workable National Action Plan on Agrobiodiversity.

2. Agrobiodiversity and the available indigenous knowledge should be documented urgently through a well-organised approach. Both the formal and

informal knowledge available with the farming communities deserves this documentation.

3. A comprehensive mission mode programme should be implemented for all areas related to agrobiodiversity. The pace of collection and conservation of agrobiodiversity should be accelerated. Efforts on bioprospecting and effective utilisation of the collections should be intensified. It should be ensured that the collections are secure and safe. What is conserved must be protected as a national heritage.

4. High priority must be accorded to various researchable issues relating to agrobiodiversity, which could be pursued through active involvement of the National Agricultural Research System (NARS) and other stakeholders, such as the NGOs and the farming communities.

Agrobiodiversity Conservation

5. A base collection of 1.60 lakh germ plasm samples of various crop species and their relatives is presently conserved in the National Gene Bank at NBPGR. This facility holds invaluable national resource and hence, must attract the concessions available to buildings declared as national heritage.

6. A sample of all plant genetic resources available with various holder organisations/ institutes/universities/communities in the country must be made available to the National Gene Bank for safe conservation for posterity.

7. Modern technologies, such as *in vitro* and cryopreservation, are needed for conservation of non-orthodox seed species, vegetatively propagated crop plants, medicinal and aromatic plants and other high value crops. The required support should be provided for research to develop the needed technologies. Responsibilities should be assigned to designated institutions for standardising protocols for specific plant species.

8. *In situ* on-farm conservation should be promoted. For an effective *in situ* on-farm conservation of traditional cultivars/landraces, specific areas, practices, systems and species should be identified. A system at the national level is required to be evolved to assess farmers' views on and expectations from *in situ* on-farm conservation of genetic diversity. Suitable modes and mechanisms for providing needed incentives to farmers should be evolved so as to ensure safe and effective conservation of genetic heritage through on-farm practices.

9. Ethnic communities, particularly women, have played an important role in the conservation of traditional varieties, especially in fragile agro-ecosystems. The role of women and communities must be recognised and rewarded while implementing on-farm conservation strategies.

10. Pilot scale experiments should be undertaken to develop suitable conservation model(s) for *in situ* on-farm conservation. Indicator species should be identified for assessing the health of varying agroecosystems.

11. Conservation of available breeds/strains of animals, fish and microbes needs urgent attention. While recognising the efforts being made by the respective ICAR Bureau of animal and fish genetic resources, these programmes should be intensified in a decentralised approach involving all the concerned institutions and communities. Also, attention is needed to conserve agriculturally important micro-organisms. The initiative to set up a separate Bureau for their conservation is a welcome development.

Agrobiodiversity Management

12. Simple, effective and practicable mechanisms for prospecting agrobiodiversity and monitoring should be evolved. Selected amateur groups, including the school and college students, should be enlisted for this purpose.

13. Genetic variability of native, under-utilised species of food crops, fruits, medicinal, aromatic and other economic plants should be documented on priority. It should be supplemented through need-based introduction of useful species. Selected, hitherto unexploited, species having future potential should be researched on and adopted.

14. There is an urgent need to adopt appropriate quarantine measures in the national interest. We must revisit the present National Plant Quarantine Policy, particularly in the context of bioengineered materials/genetically modified organisms (GMO).

15. Characterisation, evaluation and documentation of PGR should receive a high priority. Relevant improved tools and technologies, such as biotechnology, should be deployed in future.

16. The national information network and database on germplasm should be strengthened.

Germplasm Registration

17. Registration of plant germplasm should be encouraged and availed of by all concerned. Registration should be based on properly characterised, documented and researched PGR information.

18. Mechanisms should be evolved for the legal protection of landraces/traditional varieties while recognising the ownership of the farming communities, private or public breeders. Registration of these cultivars should be done at the level of *gram sabhas*, *panchayats* and blocks linked to the national registration authority, such as, the NBPGR.

19. Systems for registration of other agriculturally related bioresources, such as, breeds/strains of animal/fish/microbes, should be similarly developed and implemented on priority.

PGR Awareness/Literacy/HRD

20. Considering the relevance of agrobiodiversity in the emerging global scenario, there is a need for creating awareness and understanding about it among the public and Indian masses. Literacy campaign for conservation and sustainable management of agrobiodiversity needs to be initiated at the grass roots level, starting right with the school and *gram sabha/panchayat* levels.

21. Suitable curricula for students and orientation courses for the teachers/trainers need to be developed on priority. To begin with, the ICAR, through its own set-up and state agricultural universities, should take a lead. The University Grants Commission (UGC) and various Central and State Education Boards can expand this programme further.

22. There is a need for literacy on PGR policy issues such as, plant variety protection, breeders' rights, farmers' rights, *sui generis* system, etc. Recommendations on policy and management issues on agrobiodiversity should be widely circulated. Literature on PGR-related happenings and who's who is not accessible to most people. In order to create greater awareness about agrobiodiversity conservation and management issues in the global context and also to evolve consensus at the national level, the draft text for biodiversity legislation should be widely circulated along with selected literature on CBD, TRIPs, UPOV-1978, FAO Undertaking on PGR, Leipzig Conference, Global Plan of Action, etc.

23. Emphasis should be laid on human resource development to build required expertise in basic PGR management aspects, namely, germplasm identification, collection, characterisation, evaluation, documentation and conservation. Simultaneously, re-orientation of technology generation is warranted. HRD should be further oriented towards the needed expertise, technology and awareness for germplasm regeneration and onfarm conservation.

Access and Benefit Sharing

24. A well-understood procedure for accessing the genetic resource materials owned by farming communities/individuals and a fair and equitable sharing of profits arising from their use should be established. The percentage of profit going to communities can vary depending on margin of profit. For example, 5 per cent in case of crop plants and 10 per cent for medicinal and aromatic plants or plants of industrial value, etc. The revenue generated through benefit sharing should be transferred to a national gene fund and should be exclusively available for research and development relating to public good and/or for the community development activities.

25. Needed sharing of conserved materials among community/national seed banks would be desirable in the national interest. A fair and equitable mechanism should, therefore, be developed jointly by all stakeholders in order to safeguard the interests of all concerned.

National PGR Policy

26. A National Policy Advisory Committee with wide representation should be instituted to act as an advisory body to the central government on matters concerning agrobiodiversity conservation.

27. A national legislation on agrobiodiversity/genetic resources should be developed so that effective instruments are made available for conservation, management and use. In the proposed draft legislation on biological diversity, specific mention of agrobiodiversity distinct from the biological diversity, be made and appropriate provisions provided to establish a separate national authority for dealing with issues related to scope, access and conservation of agrobiodiversity. The Department of Agricultural Research and Education should be given the nodal role for these aspects at the national level in the best scientific interest and for required technical coordination.

28. A National Gene Fund must be established, keeping in view the dimensions of these activities and the urgency of the matter. It may include allocations from consolidated fund of India; royalty on finished products of proprietary nature, percentage of profits as emanating from equitable sharing of benefits accrued from the use of PGR and tax-free donations from the users of these genetic resources.

29. Most of the developing world looks towards India for suitable models for agrobiodiversity conservation, management and use. The country is well poised for required interactions with the developed world, being equipped with the required institutional support and the human resource needed for generating improved technologies. Hence, our *sui generis* system for protecting agrobiodiversity should be both innovative and practical in dealing with all scientific, political and legal issues.