Crops, Creativity and Compensation: Honey Bee network approach

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Many communities have been extremely concerned about the sustainability of their cropping systems as a part of overall farming systems, particularly in marginal environments. Their concern was reflected in the choice of the crops, rotations, inter or mixed cropping systems, non-chemical input management systems and above all in a whole range of creative innovations requiring individual or group action. The scientists have of course been quite conscious of the need for making cropping system sustainable. Some of them have also started paying attention to the local knowledge systems of the farmers. The bridges between formal and informal knowledge systems, however, remain weak. It is to remedy this weakness and highlight the role of grassroots creativity and innovations that Honey Bee network was launched seven years ago.

Why Honey Bee Network?

The concept of Honey Bee evolved in response to a dilemma with regard to our responsibility towards those communities and individuals who conserve diversity and the knowledge around it, but never partake in any benefits that accrue through value addition to outsiders. The ethical basis of extraction of knowledge as well as resources triggered search for a suitable metaphor to resolve this dilemma.

Honey Bee does what we, intellectuals, often don't. It collects pollen from the flowers and flowers don't complain. When we collect knowledge as well as resources (such as land races), I am not sure that farmers don't complain.

It connects flower to flower. We do not have any arrangements for sharing information about the knowledge or resource we collect from people back with them because we neither have Knowledge Network accessible to people nor we communicate in local languages.

We have collected more than 5300 innovations as well as examples of traditional ecological and technological knowledge from 2300

villages of one state (Gujarat) alone. Similar examples have been collected from other states such as Rajasthan, Tamilnadu, Karnataka, UP, etc., with in India. The Honey bee data base is supported by SRISTI (Society for Research and Initiatives for

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Sustainable Technologies and Institutions)- a NGO and Indian Institute of Management, Ahmedabad. It has innovations from Mongolia, Vietnam, Uganda, Kenya, Columbia, Ecuador, American Indian communities in North America, etc. Honey bee newsletter has been published in several languages for last seven years and the network extends to 75 countries.

This data base is one of the largest in the world with information about name and address of the innovators (individuals as well as communities) or providers of information. Council of Scientific and Industrial Research (CSIR) has recently initiated steps to establish formal links between Excellence in the informal systems with that in the formal systems through a Memorandum of understanding (MOU) between SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions)- a NGO supporting Honey Bee network and CSIR. Collaborative research with clear benefit sharing arrangements with grassroots innovators through SRISTI is being pursued in several areas of sustainable agriculture including microbial diversity as indicator of soil eco-systems health, herbal pesticides, indigenous veterinary medicine based on local biodiversity etc.

Cataloging Diversity: How do we read the book of diversity?

A serious problem is the inadequacy of passport information sheets in the gene banks whether at international, national or regional level. If we do not read the ‘book of diversity’ embedded in local knowledge adequately, we would of course lose much of information available in nature and with local communities.

Our studies have shown that most breeders did not/could not document the information about the resource providers, often did not recall the selection criteria used by the local communities, and did not include the recipes indicating the culinary characteristics. In the absence of this information, it would be very difficult to revisit the exact sites and share any benefits that may accrue in future through value addition in these land races.

In the case of animal germplasm, situation is even more serious from the point of view of conservation. Unlike crops, where a small sample of seeds selected properly may capture a large part of variance of the population, among animals one needs very large sample to achieve the same result. Most ex-situ gene banks have very few animals of different breeds. The passport information sheets for animal germplasm are even more inadequate.

Honey Bee network has tried to address not only the gaps in our knowledge of peoples' creativity and innovation, but also in terms of germplasm characterization. The recent strategy of FAO on developing DAD-IS (Domestic Animal Diversity Information Systems) is trying to overcome these inadequacies in a very participative manner.

Building upon local Knowledge: Towards Participative Breeding

The challenge, however, remains as to how do we make information

in the gene bank accessible to the local communities in the manner in which they can understand and make sense of it and vice versa (i.e. make breeders take note of people's knowledge). Further, how could local people obtain materials that they would need for their own breeding programmes. Obviously, if communities and selected individuals could develop such distinguished land races and animal breeds in past, they could be expected to do so in future too. The challenge of participative breeding is important for several other reasons:

a.The proportion of land races available in a local gene bank that goes into breeding programme of any crop is very small.

b.Existing ecological heterogeneity in rainfed regions and in-

creasing location specific differences even in irrigated regions (due to mineral deficiencies, changes in the water table, pest and disease regime, drainage profile, etc.) require that breeding for local specificity becomes a paramount goal.

c.Formal institutions are under resource crunch all around the world and therefore, it is unlikely that they would have resources to expand on-station research facilities in different sub regions. Participatory on-farm research is thus inevitable.

d. A very large amount of improved genetic variability in form of F7 of F8 generations/advance lines is rejected today because of its inability to surpass the available checks (control varieties). Many of these lines might prove to be extremely suitable for different locations if given a chance of being selected jointly or separately by farmers as well as scientists under local conditions.

e.The selection criteria of the farmers may be different from that of the scientists and thus may provide additional variability to select and take forward in improvement programmes. In a study on Matching Farmers' Concerns with Technologists' Objectives (1985), we found that the harvest index in millets preferred by marginal farmers was much lower than preferred by the bigger farmers. This realization has dawned on the institutional scientists only recently. The selection criteria of poor people with whom scientist do not have much opportunities of interaction might some time be different from that of others. In Bangladesh while talking to disadvantaged farmers about two different modern rice varieties, I learnt that one was preferred over another because its grains after cooking remained in the stomach for longer period. The feeling of belly fullness helped in avoiding the pangs of hunger. This criteria hasn't been recorded in literature. Whether this can be or need be bred for or not is not important. The relevant point is that choices and preferences of different classes may vary and thus provide a basis for developing diversity.

f.The level of significance at which improved varieties or advanced lines are considered superior is generally 1 or 5 per cent, particularly in terms of yield parameters. Farmers face

much higher risk and therefore might prefer technologies which reduce risk not necessarily to the extent of 95 per cent but may be 80 per cent or 75 per cent without much increasing the cost. This could become evident through participatory technology development process.

g.The gender dimension of technological suitability whether for performing farm operations or for assessing post harvest processing or cooking attributes offers additional advantages of participatory breeding.

h.Farmers innovations for management of pest and disease, nutrients, weeds, etc., documented through the Honey Bee network could be screened under the farmers' criteria and thereby help us in developing varieties which respond to non-chemical external inputs. This could mean re-ordering breeding priorities in some cases2.

i.Farmers' own selections from local material as well as other materials have led in past to development of new varieties. This is a potential which is grossly under utilized. Two example would suffice; Thakar Sing Bhai of Junagadh district of Gujarat suffered like many other farmers in 1987 drought. This was one of the worst droughts of last several decades. Government distributed groundnut seeds to overcome the seeds shortage. Thakar Sing found two or three unusual plants in the crop so grown. He selected them and grew them since then. The new variety is called Morla because the pods are slightly curved, very compact and the grains are quite bold. Each pod has two grains. Several farmers have bought this seed and have had good experience. Similarly Raja bhai, another farmer from the same district had selected few odd groundnut plants which he selected and developed into a variety.

j.Many of the crops in marginal environments are grown as mixed or sole crop. However, when breeders developed varieties even for such crops they often make selection under monocrop condition and only later try to generate intercrop combinations. Participatory breeding makes possible for breeders to select under farmers management conditions.

It is well known that the economy of rainfed farmers is primarily dependent upon livestock and yet most of the crop varieties are

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2. A farmer in Gujarat had faced a serious problem of termites in his field. He had observed that young sorghum (less than 30 - 40 days) plants when eaten by the cattle caused toxicity to the animals. He thought couldn't the same toxicity be used to control the termite also. He cut the sorghum plants and put them in the irrigation channel. Soon he found substantial control of termites. Perhaps the hydrosynydes have contributed to the control of termites. In case this hypothesis is true, it could provide a new breeding goal for sorghum which otherwise are bread for low HCN content. If farmers could get high HCN content lines which could be grown in a small patch, as a backyard herbal pesticide factory, a sustainable way of pest control could be found. Safety aspects of this practice for other soil microbial and earthworm populations will have to be carefully studied.

only screened on the basis of grain yield rather than on the basis of fodder quality. By working with the farmers, scientist can get quick feedback on such attributes and thereby make mid course correction.

Conserving Diversity: Novel approaches

(a) Conservation through Competitions: Organizing Biodiversity Contests for closing the gap

SRISTI has organised Biodiversity contests among children (more than 4000 children covered so far) to scout 'little genius'. We have come across children like Mahadev Sodha of age less than 11 years in Banaskantha district knowing 309 plants and Ankita- a girl knowing as many 165 plants at the same age. What is the destiny of such children? Will they have a chance to grow as naturalists and guardians of diversity or just become land less labourers? The possibility of the latter alternative is very high because it is in these rainfed and drought prone regions that male emigration is highest, unemployment lowest, poverty highest and drop out rate from schools highest. Incidentally in these areas (in addition to mountainous and forest regions) the propor-

tion of women headed or managed household is also very high. I have argued earlier that if the regions of high biodiversity are also regions of high poverty, then we cannot conserve diversity by keeping people poor (Gupta, 1991). Various kinds of incentives will have to be developed which may include material and non -material rewards for individuals as well as communities or groups. These contests have been very helpful in transferring knowledge and from grand parent generation to grand children (and thus closing the gap) in much lesser time and with greater efficiency than would have been the case if left to itself.

SRISTI has developed various models of incentives which need to be experimented by building upon local knowledge networks.

(b) Role of Culture in Diversity:

Why do we eat weed found in rice fields only on a particular fasting day. This weed called as Sama (Echonocloa colonum) has been conserved in cultivated field not without any purpose. Literature search on this plant revealed that in some cases it has been reported that it does not let leaf roller and some other pest complete their life cycle . It is possible that its allelopathic impact contributed to its ecological and cultural significance. How do we embed such cultural consciousness among future leaders of our society so that in situ conservation of diversity of cultivated and uncultivated plants can be strengthened.

(c) Establishing Knowledge Networks: What inspires people to take initiatives and transform their options: potential for lateral learning makes a big difference to many innovators. Honey bee network has tried to link communities conserving biodiversity and associated knowledge around the country and different parts of the world through local language networks. Today every other

sub set of society is networked except the creative individuals and innovators such as crop or animal breeders, developers of herbal pesticides, indigenous veterinary medicines etc. In the International Conference on Creativity and Innovation at Grassroots being organised at IIM Ahmedabad (Jan 11-14, 1997), we intend to bring some of these innovators together along with policy makers and researchers and activists so that future policy

options under FAO Undertaking on Plant genetic resources as well as under Convention on Biological Diversity and International Convention to Combat Desertification are generated in the light of real life experiences of grassroots innovators and not through sterile academic debates.

d) Generating Consumer Demand for diverse and organic agricultural products

There have to be many incentives for conserving Diversity as mentioned earlier but one which can provide immediate incentives for farmers growing land races in marginal environments is the generation of premium on organic and diverse natural products. Our country wide surveys of green consumers pursued through students of IIMA during summer assignments has revealed a tremendous latent demand for such products with modal value of premium most consumers are willing to pay being close to 15 per cent. The major problem is the absence of outlets where people can buy and experiment apart from facilities for certification.

SRISTI is pursuing in collaboration with IIMA and many other formal (ICAR, SAUs, MS University, Indian Institute of Sciences) and informal institutions several areas of research which can help in recognizing, respecting and rewarding local creativity. In addition we are also looking at soil microbial diversity as possible indicators of eco-systems health and approach to organic certification. The concept of Farmers' Rights is being redefined in the light of CBD and diverse set of incentive choices have been generated for conserving Diversity such as Trust Funds, Royalty, Educational and curricular modifications, venture capital funds for small innovators, risk and insurance funds for on farm experimentation, public recognition, tax on green revolution surplus farmers to provide incentive prices and procurement support to growers of land races in marginal environments, etc.

We must stress that biological diversity can not be conserved by keeping people poor and thus internal (ethical and value based) and external (material as well as non material) incentives are urgently called for.