USEING TRADITIONAL KNOWLDGE WITH SCIENCE: A "PARDYP" NETWORK EXPERIENCES FOR COMMUNITY DEVELOPMENT

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Abstract

The People and Resource Dynamics Project (PARDYP) is an integrated research for development project comprising of research and development institutions and individuals from China, India, Nepal, Pakistan, Canada and Switzerland working on the problem of the Hindu-Kush Himalayan region. Working with the communities at the region the project, has been able to contribute towards initially identifying practical needs particularly those related to food, fuel, fodder, and water, as also identification of opportunities for increased income, followed by implementation (through participatory means) of a few, well tested on farm interventions, such as, poly -house technologies for off season vegetable production, irrigation through drip, and bio composting etc., in the PARDYP watersheds of the HKH region. This paper describes the findings of the research, efforts using simple scientific principal for improving traditional knowledge and methods used by the project to spread and disseminate the findings among different community living in diverse social, cultural, agro-climatic set up of HKH with taking special impasses on the marginalized people living in the region.

Key words: Mountain watershed, Traditional Knowledge, action research, agriculture, improved options, research process

1. Introduction"

Majority of people living in mountainous region of Hindu-Kush Himalayan (HKH) depends upon agriculture for their day to day survival. There are several physical constraints to agriculture in the HKH region: remoteness and inaccessibility, marginality and fragility in term of moisture stress and poor soil conditions and a short growing season. Added to these are socioeconomic constraints such as small land holdings, labour shortages, poor productivity, poor production management, poor post production management, marketing networks and lack of entrepreneurship. All these have led to underutilization of the resource bases in the mountains and limited the generation of surpluses in the agriculture sector that could be used to invest in and support the growth of the mountain economy. The rapid growth of population has brought about extensive land use changes in the region and landholdings are becoming increasingly fragmented and smaller in size: unable to sustain the basic family livelihoods from farming alone. The traditional hill agro-ecosystems which were functioning substantially, just 3-4 decades before owing to large resource, are now weakening due to shrinking natural forests resulting in scarce organic resource to replenish soil fertility which have a direct bearing on agriculture productivity and sustainability in the region. So traditional knowledge which were time tested in past may not always provide farmers with solutions to tackle new challenges, which originate from recent intensification in agricultural land use and reduced access to biomass from common property land

Keeping in view "People and Resource Dynamics in Mountain Watersheds of the Hindu Kush-Himalayas Project (PARDYP)" an integrated research-for-development project concerned with natural resource dynamics and degradation processes in the middle mountains of the Himalayan region was started in five watersheds: one each in China, India, and Pakistan and two in Nepal (Figure 1). In India G.B. Pant Institute of Himalayan Environment and Development located at Almora, Uttaranchal executes the project.

The watersheds were selected because of degradation problems and poor conditions of the smallholder farmers. All the teams designed their action plans so as to:

1. Develop and test options for improved farming systems productivity (including land and water resources, as well as interactions with forest and livestock)
2. Test and disseminate options to increase productivity of agricultural land (focusing on soil conservation and soil fertility)
3. Identify, test and disseminate water management options for more efficient use and equitable access
4. Identify and disseminate options and approaches to improve sustainable and equitable access to water, land, and forest resources

The present paper presents the findings of some effects to improve traditional knowledge of agriculture management for increasing agriculture productivity in PARDYP India watershed - Bheta Gad Garur Ganga (BBGG).

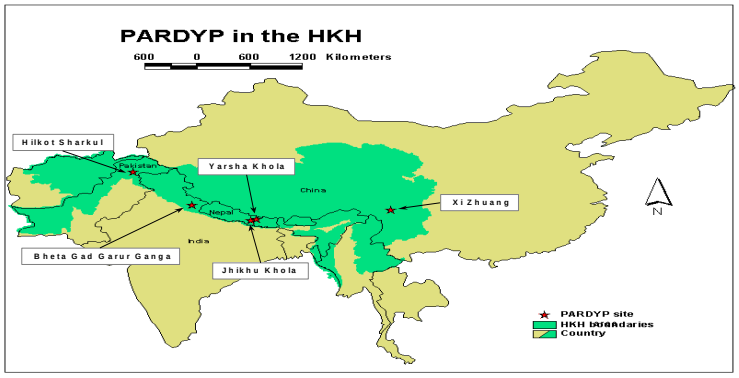

Figure 1 Map of PARDYP watersheds in the Hindu-Kush Himalayas

"2.1 Searching for innovation - Improved composting"

Himalayan ecological system is not only crucial to support the life support system of the region but also to the economy of the entire down stream catchments. The technology for the rejuvenation of the Himalayan land therefore, demands an integrated inter-disciplinary approach. Furthermore, traditional agriculture practices unrestricted use of grazing lands, increased deforestation activity and poor socio-economic conditions restricts a high cost input technology intervention. Keeping in mind that the farmers in the hills, base their soil fertility management on organic matter, PARDYP tried on low cost intervention / techniques to improve the traditional agriculture that even the poor farmers can afford.

Live stock manure is a critical component of hill farming (Figure 2). Most of the farmers of in the watershed were using the conventional methods of FYM preparation, which takes long time for decomposition and when used it is not fully decomposed. Rapid decomposition of FYM and other degradable wastes through pit composting was introduced with the idea that it could help on improving soil fertility and crop production. Though this simple technology, both the composting period as well as loss of nutrients can be reduced considerably (Table-1). The pit-compost helps in maintaining soil fertility as well as improves the physical and chemical properties of soil (Figure 3). Though the energy required for pit compost is

Figure 2 Traditional method of compost preparation in watershed.

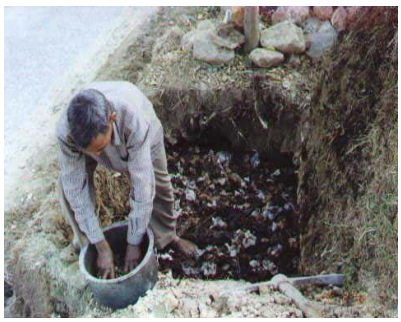

Figure 3 Pit composting method being tried on a farmer's field.

Table-1 showing major difference in different type of compost (dry weight basis)

Compost type	Day for preparation	Nitrogen (%)	Phosphorus (%)	Potassium (%)
Traditional	8-10 month	0.6 - 0.8	0.06 - 0.08	0.6 - 0.8
Pit	5-6 month	1.1 -1.4	0.11 - 0.14	1.4 - 1.6

much but the return by the use of such FYM is more in compression to the traditional compost and the amount the of fertilizer for per plant is also less thus decreases the women workload. Cost benefit analysis of traditional compost with improved ones, shows a good return from the improved compost.

"2.2 Improving the lively-hood through off season vegetable production: polyhuse/ polypit intervention"

Traditionally the farmers were growing vegetable during rainy season (mid June to September) and that time there was a plenty of stock in market with no market rate. Cultivation of off-season vegetable was introduced in the watershed after analyzing the lean period and market demands. It was found if the crop comes few weeks earlier than the traditional one, one can get a good price of his commodities (Table-3). Basic problem with the off-season vegetable production was a big difference between lowest and highest temperatures during winters (0 – 24°C) and germination of seed and growth of the crop is adversely affected. However, some of these problems were overcome by setting up of low cost polypits and polyhouses. Polypit technology involves digging of an appropriate sized pit in the ground and covering it with a ploythene sheet at the top over a suitable support frame. During the day time when there is adequate warmth due to sunlight the polythene sheet is partly or completely removed to allow full sunlight into the pit for maximizing photosynthesis by the plants. The pits are covered and "sealed" during the night (as well as during the day when the temperature is too low) (Figure 4, 5).

Figure 4 An "on-site training" on various aspects of off-season vegetable.

Figure 5 A PARDYP research farmer with his off-season polyhouse nursery in Bheta Gad

Table 3 showing difference in market rates of traditional and off- season vegetable in watershed.

Market rate of vegetable in different growing seasons				
Crop	**Traditional**		**After intervention**	
	Time	**Rate (Rs)**	**Time**	**Rate (Rs)**
Pumpkin	3rd week of June	4-6	4th week of March	15 - 20
Tomato	4th week of June	8-10	2nd week of April	20 - 25
Brinjal	4th week of June	5-7	2nd week of April	15 – 20
Capsicum	4th week of June	6 – 8	2nd week of April	35 – 40
Cauliflower	2nd week of June	10 – 12	1st week of May	30 - 35

US 1$= IC 45

This intervention gain popularity among the villagers because apart from the earning form off-season vegetable a significant benefit to the family members is in the form of nutritious food, which they are getting as fresh vegetable. The farmers are getting more income from same piece of land (Table-4).

Table 4 showing benefits of off-season vegetable production case study from Garua Ganga watershed

Activities	**Year/ Inputs/outputs (Rs)**					
	1999	2000	2001	2002	2003	2004
Polyhouse (1)	3500	-	-	-	-	
Inputs: Seeds, manure, pesticides etc.	930	1600	2200	2800	2150	3350
Outputs:						
Vegetable nursery + horticulture plant	1020	5770	4000	4700	5075	7500
Vegetable production	4727	5955	9072	10466	11090	12786
Net gain/loss (Rs.)	1317	10125	10872	12366	14015	16936

US 1$= IC 45

"2.3 Valve addition to water harvesting technology- drip irrigation"

Water management in Himalaya agriculture is confronted by too-much and too-little water syndrome. Monsoon pattern of rain fall leads to runoff, washing away soil and nutrients from tiny terraces, leaving rest of the year dry. This situation limits rain water management in the rainfed agriculture. Water shortages caused by fluctuations in rainfall can seriously damage crops and reduce yields. Long dry spells lead to roots and stem wilting and can lead to plants death. Farmers need to irrigate their crops to supplement the often inadequate rainfall. PARDYP has promoted drip irrigation in its watersheds. It is a simple technology that helps to overcome dry season water shortages. The application of drip irrigation ensures a uniform water supply to plant roots, resulting in better growth and higher crop yields (Table-4). An upland farmer using drip irrigation fed from a small water source can easily produce off-season vegetable or cash crop in lean period.

Table 5 Effect of Drip Irrigation on Geranium

Methods	**Avg. Height (Cm.)**		**% increase over control**
	Initial	**after 70 days**	
Drip irrigation	**3.2**	**11.4**	**+ 123**
Traditional irrigation	**3.2**	**7.5**	**+47**

"3. The communication process"

The selection of improved options for testing was based on a problem analysis with the farmers using participatory rural appraisal methods; review of literature on problems related to farming systems in the hills and mountains; understanding of watershed's agriculture calendar and market analysis. This was followed by consultations with scientists for possible solutions and identification of potential options, and eventually trying out the options with farmers.

The reasons for selection of off-season vegetables were: improved economy and better nutrition of the families. Integration of improved composting was considered to be an eco-friendly approach to maintaining soil fertility.
The research targeted smallholder farmers. The project provided incentives in the form poly-house materials, improved seeds and technical support. A team of research associates and field technicians were responsible for the research activities.
A permanent office in the study watershed added to the credibility of the research work.

The first year was focused on testing the options. During repeat trials in the following years more farmers, including women, from the watershed were involved in the implementation, monitoring and evaluation of the improved options. During all the years, treated plots were compared with control.

The team also organized on-site training programs and group discussions, which have enabled many other farmers to adopt the practices demonstrated by the project. Information has been also shared during national and regional workshops, conferences, and seminars; through PARDYP extranet [1] and newsletter; during annual meetings of specialists working on agriculture productivity in PARDYP. The project invites NGOs, research and development programs' staff members, self help groups and other village institutions for during knowledge sharing events, such as farmer visits (Figure 6)., on-site training, farmer meeting (Figure 7), etc.

Figure 6 A woman farmer showing her off-season tomato crop to PARDYP regional coordinator

Figure 7 An exposure visit organized by PARDYP for women groups.

"4. Discussion"

Results of the on-farm research conducted by PARDYP India shows that farmers in the middle mountains of the Indian Central Himalaya can easily improve their crop yields by at least 2 times by adopting science in their traditional knowledge. Farmers have confidence in their traditional knowledge and new knowledge should complement the traditional knowledge. Thus, methods of extension that build on discussion and interaction learning among farmers are most appropriate.
Based on the lessons learned by the project teams, in order to adopt such measure by the farmers, the state-run extension agencies will have to play a more proactive role. Simultaneously, decision makers will have to ensure that the knowledge existing in these service centers is updated and that the institutional human and financial capacities are strengthened. Importantly, women must be involved in the research process as they are the ones who need to decide on new technologies and make adaptations

"5. Conclusion"

The farming system in Hindu-Hush Himalaya has traditionally been more of a way of life than enterprise. The number of people depends on agriculture in HKH has been increasing year after year, while productivity has declining. Agriculture in region is characterized by traditional techniques, minimal use of external inputs, rudimentary mechanization demising yield of major crop, deficiencies in research and inadequate knowledge of optimum use of scare resources. The gap between farmers' needs and their farm income is expected to widen further in the year ahead unless well-planned corrective measure are implemented. The PARDPY experience of improving the traditional knowledge based on scientific facts will help in narrowing the gap in watershed management in the mountainous area of Hindu-Kush Himalaya.

"6. Acknowledgement"

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“7.0 References”

[1] Anonymity http://extranet.icimod.org.np/pardyp/