Development, **2008**, **00**, (1–7)

www.sidint.org/development

Local/Global Encounters

Sustaining Agriculture-Based Livelihoods: Experiences with non-pesticidal management in Andhra Pradesh

G.V. RAMANJANEYULU AND V. RUKMINI RAO

Q1

ABSTRACT *G.V. Ramanjaneyulu and V. Rukmini Rao argue that the Indian agrarian crisis is due to lopsided policies in technology and support to farmers, faulty regulatory and market systems. Experiences with scaling up an ecological model of pest management in agriculture in Andhra Pradesh provide an important breakthrough in promoting sustainable models in agriculture.*

KEYWORDS *pesticides; farmer's knowledge; Community Based Organizations; local resources*

Introduction

Farming in India evolved over centuries through farmers' innovations in identifying locally suitable cropping patterns and production practices. In India, the colonial period led to breakdown of sustainable systems resulting in a crisis of food production during 1960s. In response India strived for food self-reliance. The country chose to use high-yielding varieties (more appropriately high-input responsive varieties) and chemicals in what is popularly known as the green revolution. This continued in the quest to modernize agriculture that has promoted an increasing use of high-yielding varieties/hybrids, chemical pesticides and fertilizers across crops and situations displacing farmers' knowledge, own seeds and practices. The country became self-reliant in grain production for a while but farmers lost their self-reliance in the process due to excessive dependency on external inputs. Farmers are now caught in serious ecological and economic crises manifesting in the forms of migration, indebtedness and in extreme cases, farmers' suicides.

Q2

In response to the deep crisis in agriculture, farmers and various support organizations are trying innovative approaches to sustain agriculture. One such initiative is the 'Non-Pesticide Management' (NPM) of crop pests, to reduce the costs of cultivation by adopting a set of practices based on farmers' knowledge supplemented by modern science that makes best use of local resources and natural processes by the farmers and Women Self Help Groups (SHGs) in Andhra Pradesh (AP). NPM is one of the components of the 'Community Managed Sustainable Agriculture' programme with technical support from Centre for Sustainable Agriculture and its partner non-governmental

Development (2008) **0,** 000–000. doi:10.1057/dev.2008.64

Journal: DEV | ☐ Disk used | Despatch Date: 10/10/2008
Article : ppl_dev_lg2-51-4 | Pages: 1 – 9 | Op: KGU Ed: PRASAD

organizations (NGOs) and financial and administrative support from the Society for Elimination of Rural Poverty (SERP), Government of AP. During monsoon (*Kharif*) in 2007, more than 350,000 farmers from 1,800 villages in 18 districts of the state were practicing NPM in more than 280,000 ha in various crops. Sixteen of these districts are part of the 32 districts with serious agrarian crisis identified by the Government of India. The savings by rejecting chemical pesticides, in cost of cultivation on pest management ranged from US$15–150/ha without affecting the yields. The savings on the health costs are also substantial.

Pests, pesticides and the distress

Among the production inputs in agriculture, chemicals especially pesticides occupy major share of costs in crops like cotton, chillies and rice. The pest resistance and resurgence due to the abuse of pesticides propelled mainly by a lack of awareness, regulation of pesticide marketing extended on credit with high interests by 'all-in-one dealers' (money lenders cum dealers of seeds/fertilizers/pesticides) and lack of market support ended up pushing hapless farmers into a vicious debt trap from which suicides were sought as a way out. The pesticides that were promoted to solve the farmers' problems were consumed by farmers to kill themselves.

Pesticide poisoning of human beings through exposure to the toxic fumes while spraying is a lesser known and lesser acknowledged aspect of pesticide abuse in places like Warangal in AP (Kuruganti, 2005a, http://www.csa-india.org; Mancini *et al.*, 2005, www.ijoeh.com), Tanjavur in Tamil Nadu (Chitra *et al.*, 2006) or Batinda in Punjab (Mathur *et al.*, 2005). The socioeconomic and environmental conditions in which the agriculture workers and small and marginal farmers work do not permit them to adopt the so-called 'Safe use practices' often promoted by industry or agriculture scientists (Kuruganti, 2005a, http://www.csa-india.org).

There are also several reports on the chronic effects of the chemical pesticides on farmers (Mathur *et al.*, 2005), growth and development of children (Kropp *et al.*, 2005, http://www.ewg.org/reports/bodyburden2/; Kuruganti, 2005b, http://www.colorado.edu/journals/cye) and women's reproductive health.

The chemical pesticides leave larger ecological footprints in manufacturing (e.g. Bhopal gas tragedy, a gas leak from a pesticide manufacturing unit killed more than 20,000 people during 1984), storage, transport and usage polluting the soils, water and air. The pesticide residues in food, soil and water enter into the food chain and cause serious health problems to human beings and other living beings (Karanth, 2002; Kuruganti, 2005a, http://www.csa-india.org; Kuruganti, 2005b, http://www.colorado.edu/journals/cye). The pesticide residues are even found in human milk (Down to Earth, 1997). Over time, soils in the pesticide-sprayed crop fields can become low in nitrogen compounds, so more fertilizer is needed to produce the same yield (Fox *et al.*, 2007, www.pnas.org_cgi_doi_10.1073_pnas.0611710104).

While the inevitability of pesticides in agriculture is promoted by the industry as well as public research and extension bodies, successful experiences are emerging from farmers' innovations that call for a complete paradigm shift in pest management.

Shifting paradigms: NPM

Looking for solution to the ecological and economical problems of pests and pesticides in agriculture gave rise to several eco-friendly innovative approaches that do not rely on the use of chemical pesticides. These initiatives involved rediscovering traditional practices to control pests. Contemporary grass root institutional innovations promoted by the government, supplemented by strong scientific analysis, supported by civil society organizations led to upscaling the programme in the state of AP.

The 'NPM' that emanates from collaborative work of public institutions, civil society organizations and farmers (women and men) in AP shows how diverse players can come together to generate new knowledge and practice to evolve more sustainable models of agriculture.

PPL_DEV.LG2-51-4

Pests are not a problem but a symptom. Disturbance in the ecological balance among different components of crop ecosystem makes certain insects reach pest status. From this perspective, evolved the NPM which is an 'ecological approach to pest management using knowledge and skill based practices to prevent insects from reaching damaging stages and damaging proportions by making best use of local resources, natural processes and community action'.

Generating successful village experiences

Punukula: the pesticide-free village

Punukula, a small tribal village in Khammam district in AP, created waves by formally declaring itself pesticide-free in 2003. Farmers here gave up using chemical pesticides for crops such as cotton, chilli and rice – all known to use notoriously high quantities of pesticides.

The Punukula farmers demonstrated that they save up to US$ 75,000 annually on agricultural inputs by adopting NPM. With a total of 240 ha of farmland in the village each farmer has been able to save at least US$ 300 per season, as they do not have to buy expensive pesticides (Figure 1).

Enabavi: another village shows the way

Enabavi is probably the first modern-day organic farming village in AP. The entire village, in each acre of its land, on every crop grown here, has shunned the use of chemicals in agriculture. They neither use chemical fertilizers nor chemical pesticides in their farming. This in itself meant a tremendous saving for the village in monetary terms.

Enabavi, with just 45 households in the village belonging mostly to the backward castes, started shifting to non-chemical farming about five years ago. Then in 2005–2006, the entire land of 113 ha was converted to organic farming. Special training sessions have been organized by CROPS, a local NGO to rope in children into this new system of cultivation in the village.

The farmers here grow their food crops of rice, pulses, millets, etc., mostly for household consumption. In addition, they also grow crops like cotton, chilli, tobacco and vegetables for the market. Their average spending on chemical fertilizers and pesticides across crops used to be around US$ 220/ha, while it was around US$ 31.25/ha for seeds. This more often than not meant credit from the input dealers, who would also double up as traders for the produce. These traders would dictate the price for the produce in addition to

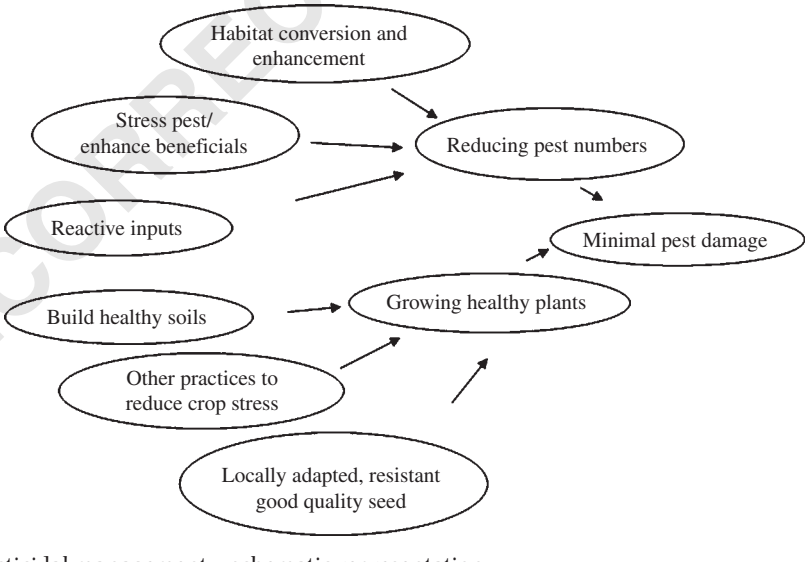

Figure 1: Non-pesticidal management – schematic representation.

PPL_DEV.LG2-51-4

charging interest for the inputs supplied. Now, all of this has changed.

Today, Enabavi has many valuable lessons to teach other farmers, not just on how to take up sustainable farming. They also have lessons to share on social regulation, learning from each other, the benefits of conviction born out of experience and most importantly, the way out of agricultural distress by taking control over one's own farming.

Advocacy

AP state witnessed increase in farmers' suicides due to indebtedness from 1986. During 1997–1998, several farmers committed suicides after the cotton crop failed in Telangana region (this region has low rainfall and poor soils). An estimated 1,200 farmer suicides were reported between June and August 2004. One of the reasons for the rise in suicides has been the crushing burden of debt; many farmers buy expensive seeds and pesticides and when the crops fail, their own survival becomes difficult. In this context community-supported agriculture (CSA) advocated with the state government on the significance of scaling up of ecological farming practices like NPM. CSA organized a field visit for the Honourable Minister for Agriculture, Government of AP, Sri N. Raghuveera Reddy, to Punukula village along with Agriculture Scientists, Officials from Department of Agriculture and Media representatives during October 2005. CSA also made a presentation to the Farmer's Commission headed by Ms. Jayati Gosh appointed by Government of AP to probe into the farmers' suicides issue and suggest ways and means of addressing it. Several senior officers from the Government of AP have visited Punukula Village and later Yenabavi village. Honourable Minister for Commerce, Government of India, Sri Jayaram Ramesh also visited both the villages and other locations where NPM work was going on. Among the various organizations and departments, SERP, Government of AP, working with Women SHGs came forward to provide a platform and required institutional and financial support.

NPM scaling up with support from Government of AP

SERP is a registered society under Department of Rural Development implementing the largest poverty alleviation project in the state of AP. The project financed by the World Bank understands that sustainable poverty eradication requires the recognition of the poor as active partners in the processes of social change; therefore, all project interventions are demand-based and are in response to the proposals conceived and planned by the poor.

The project reaches the rural poor families through social mobilization processes and formation of SHGs, federated vertically into Village Organizations at village level, Mandal Samakhyas at the mandal level and district level organizations. The project envisages that with proper capacity building the poor women's federations would begin to function as self-managed and self-reliant people's organizations.

Process of NPM scaling up

CSA and WASSAN (Watershed Support Services and Activities Network, a sister organization of CSA working on natural resource management and livelihood issues) conducted a pilot in Mahaboobnagar district to create a working experience with Mandal Mahila Samakya (Federation of Women Self Help Groups), of Kosigi mandal during December 2004. Women and men farmers were trained systematically and technical support provided in the form of coordinators who were accountable to the Women SHGs. As a result in 90 ha, average savings of US$75/ha on pigeon pea was recorded and the total savings were US$6875 (WASSAN, 2006, http://www.wassan.org).

Community-managed systems

Based on the experiences drawn from the pilot, the programme for 2005–2006 was initiated by establishing clear institutional systems and a community-managed extension system in nine districts of AP. The programme is named

Community Managed Sustainable Agriculture. Five villages were grouped into a cluster and are provided with a cluster activist. Each village had a practicing farmer selected as village activist who coordinated the village level capacity building programmes in the form of Farmer Field Schools. At the district level, the project is managed by District Project Manager. Better quality products from such production systems also fetch a better price to farmers and are highly preferred by discerning consumers (refer http://www.downtoearth.org.in/default20060531.htm). Also, this NPM intervention for the first time shifted the control in terms of production back to the farmer (Sopan, 2006, http://www.downtoearth.org.in/default20060531.htm).

Awareness was created through state level campaign about the ill effects of pesticides and the potential alternatives. Communication material was created in simple language with the aid of visuals whenever possible and widely distributed for use.

Establishing seed banks

In addition to NPM, efforts were initiated to establish seed networks so that farmers can produce and share their seed. Seed banks are set up in 100 villages where farmers could retain, replace, reuse and revive seed. All the systems and regulations are managed by the community. The pilot in Ananthapur District has shown good results. In addition efforts have also begun to promote non-chemical soil productivity improvement practices based on the experiences of the villages like 'Yenabavi' in Warangal that became the first organic village in the state.

This scaling up experience in AP has broken the myth that pesticides are inevitable in agriculture and has also provided important lessons on the paradigm shift in technology, institutional systems and support systems required for sustaining agriculture especially of small and marginal farmers.

Partners in community-managed sustainable agriculture

	Participating farmers	Women SHG federations	Exclusive staff	NGOs for technical support
Village	Sasya Mitra Sangha	Village Organization	Village activist	
Cluster	CRPs		Cluster coordinator	
Mandal	CRPs	Mandal Samakya		Local NGOs (98)
District	CRPs	Zilla Samakya	District Project Manager	One NGO as lead organization
State	CRPs		State Project Advisor (NPM)	CSA

From pest management to sustainable agriculture

The successful grounding of NPM during 2005–2006 provided important learning on how any ecologically sound and economically beneficial technology can be scaled up by providing proper institutional support. During 2006–2007 more farmers in the same villages and more villages in the same districts and a few new districts joined the programme.

Further expansion

During 2007–2008 the programme is further expanded to cover 1,800 villages in 18 districts. There are more than 350,000 participating farmers cultivating 280,000 ha. In the villages that are in the second-year cycle, works on soil productivity management with local resources and local seed management have been planned. Additional activities taken up are:

- Special focus on certain commodities to deal with post-harvest management to increase the

value of the commodities. This year, village level quality control centres were initiated in chilli-producing villages.
- Best performing villages are identified as resource villages and best practicing farmers are identified as community resource persons who will help in further scaling up of the programme.
- Community Seed Banks where farmers produce, save, share and use their own quality seed were established in 70 villages.
- Programme was integrated with other ongoing programmes like National Rural Employment Guarantee Program to provide further employment opportunities to the agriculture workers.

Total programme expenditure is US$11/ha. The state government proposed to scale up NPM into organic farming in 5,000 villages over next five years covering 10 million hectares with an outlay of US$45.5 million. The proposal has been accepted under Additional Central Assistance from Prime Minister's package of economic support for distress states called Rastriya Krishi Vikas Yojana.

Institutional arrangements

Centre for Sustainable Agriculture provided the hand holding support for initial three years. The hand holding support was in the form of:

- designing the project and preparing project proposal for financial support;
- building partnerships between identified NGOs, Mandal Samakhyas, District Rural Development Agency and SERP;
- designing institutional systems at village, cluster level, district level and state level;
- providing technical support in the form of regular training, monthly monitoring visits and responding to emergencies;
- designing resource material, technical packages, conducting demonstrations, conducting review meetings, etc.

Local NGOs provided the day-to-day technical support to the farmers.

The entire programme was anchored with the Federations of Women Self Help Groups. The women have effectively managed the programme.

SERP provided the financial support and administrative support for the programme.

The three years of partnership of CSA with SERP, NGOs, Federations of Women Self Help Groups and Farmers in providing handholding support to promote ecological farming practices has created confidence among the people that farming can produce an income and be sustainable. In many villages the farmers who gave up farming and migrated to cities are returning back to their villages. This partnership could also increase the technical skills of the SHG groups. From 2008 to 2009, a withdrawal strategy is initiated where in several villages, SHGs are handling the programme on their own. The CSA also has shifted its roles from handholding to move on to do more basic work to establish further alternatives in technologies, farmers' institutions and resolving marketing problems.

Conclusions

The last three years' experience shows that moving towards local resource-based sustainable agriculture is the only way to sustain the livelihoods of small and marginal farmers. Community Based Organizations like Federations of Women Self Help Groups form an excellent institutional platform for scaling up such models. To sustain agriculture and agriculture-based livelihoods calls for a complete paradigm shift in the way agricultural practices are understood, developed, promoted and supported. The new paradigm is based on implementing the local resource-based technologies, farmer control and community-managed extension systems.

References

Chitra, Grace A., V.R. Muraleedharan, T. Swaminathan and D. Vijayaraghavan (2006) 'Use of Pesticides and its Impact on Health of Farmers in South India', *International Journal of Occupational and Environmental Health* (12): 228–33.
Down to Earth (1997) *Toxic Substances in the Human Environment* 5(19).

PPL_DEV.LG2-51-4

Fox, Jennifer E., Jay Gulledge, Erika Engelhaupt, Matthew E. Burow and John A. McLachlan (2007) 'Pesticides Reduce Symbiotic Efficiency of Nitrogen-Fixing Rhizobia and Host Plants', *Proceedings of the National Academy of Sciences* 104(24): 10282–7, Available online.

Karanth, N.G.K. (2002) 'Challenges of Limiting Pesticide Residues in Fresh Vegetables: The Indian experience', in E. Hanak, E. Boutrif, P. Fabre, M. Pineiro (Scientific eds.) *Food Safety Management in Developing Countries*, Proceedings of the International Workshop, CIRAD-FAO, pp 11–13, December 2000, Montpellier, France.

Kropp, Timothy, Richard Wiles, Sean Gray and Chris Campbell (2005) *Body Burden, The Pollution in Newborns*, Washington, DC: Environmental Working Group, Available online.

Kuruganti, Kavitha (2005a) *Killing or Poisoning: Pests or human beings?*, Hyderabad: Centre for Sustainable Agriculture, Available online.

Kuruganti, Kavitha (2005b) 'Effects of Pesticide Exposure on Developmental Task Performance in Indian Children', *Children, Youth and Environments* 15(1): 83–114, Available online.

Mancini, Francesca, Ariena H.C. Van bruggen, Janice L.S. Jiggins, Arun C. Ambatipudi and Helen Murphy (2005) *Acute Pesticide Poisoning among Female and Male Cotton Growers in India* 11(3), Available online.

Mathur, H.B., H.C. Agarwal, Sapna Johnson and Nirmali Saikia (2005) *Analysis of Pesticide Residues in Blood Samples from Villages of Punjab*, New Delhi: Centre for Science and Environment.

Sopan, Joshi (2006) 'Out of Trap', Down to Earth, July, Available online.

WASSAN (2006) Non Pesticidal Management, Available online.

PPL_DEV.LG2-51-4