



## Does Endosulfan have an **ALTERNATIVE?**

Non Pesticidal Management – A large-scale success story  
from Andhra Pradesh, India



May 2009

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### Non Pesticidal Management – A large-scale success story from Andhra Pradesh, India

In the six years since 2002 there has been a silent revolution taking place in the remote villages of Andhra Pradesh. Farmers who had suffered adverse effects from modern agricultural practices turned to a system called 'Non Pesticidal Management' (NPM). This has provided economic and social benefits, as well as an understanding of the effects of pesticides like endosulfan and monocrotophos, and knowledge of alternatives. This time it was not about substituting safer pesticides, but about employing safer sustainable methods that remove the need for pesticides altogether. And this is happening in 3,000 villages, over an area of 1.7 million acres.

Andhra Pradesh was in the news in early 2000 for the large scale migration of farmers following the agrarian crisis caused by drought in its central districts. The situation had worsened by 2006 and a large number of farmer suicides were recorded in the state, as with other states of India.

The farmers faced severe problems that compelled them to migrate or take their own lives. The chemical intensive farming demanded intensive resource use, at the same time diminishing the role of the farmers' skills through the externalisation of knowledge and tools. Huge input costs for pesticides and chemical fertilizers made production capital



intensive and, therefore, unaffordable for small and marginal farmers. Yet even so, pest infestations increased. Many farmers became indebted to pesticide dealers, seed vendors and money lenders. An acute water shortage coupled with continuous and diverse pest attacks literally took away the hope of recouping unprecedented losses. Loss of hope, money and health were expressed through suicides.

But there were also the voices and deeds of people who tried to practice, demonstrate, and take forward the traditional farming practices. Many of these efforts were successful. One such recent endeavour is the Non Pesticidal Management (NPM) movement in the chemically intensive farming corridors of Andhra Pradesh. To date it involves 1.7 million acres of cultivable land, accounting for 5 % of land under cultivation in Andhra Pradesh.

## The Story of Enabavi

Enabavi is a small village in the Warangal district of Andhra Pradesh, about 80 kilometres north of Hyderabad, the capital city. Enabavi means 'place of open wells and hillocks'. Consisting of undulating dry land, this village is now in the limelight for being a 'Pesticide and GM free' village. Enabavi is now more than just a village: it has turned into a learning centre for NPM and organic farming. Fifty one families form this small hamlet and together they own 282 acres of land. Of this, 182 acres is cultivable and the rest comprise water reservoirs ('tanks') that are submerged during the rainy season.

The villagers grow many diverse crops, including paddy, red gram, ground nut, pulses, sesame, cotton, tobacco, chillies, garlic, tomato, brinjal, onion, bhindi, cluster beans, palak, portulaca, amaranthus (green), cucumber, bottle gourd, bitter gourd, ridge gourd, and pigeon peas. Open wells provide the main sources of water.

Mr. Ettaboina Siddulu, a 31 year-old farmer, is the elected representative of Enabavi in Manickapura Gram Panchayath. He has been a farmer for 15 years and owns 2 acres of land, of which 0.5 acres is under paddy. For the past 6 years he has practised NPM, and says, *"I used to cultivate cotton which is a pesticide intensive crop. Aphids, whitefly, boll worms and green leaf hopper created problems for me. I resorted to chemical pesticides to protect my crops but found nothing is working for me. I even had to sell my buffalo to buy fertilizers and pesticides."*

Mr. Siddulu used mainly endosulfan and monocrotophos to control pests. He observed that each year pesticide consumption increased, but the yield decreased. Some times the cost of pest management was as high as 40% of his returns and he was left with nothing. On average he earned Rs.10,000/- from his 2 acres of land annually.

*"After I turned to NPM, dependency on externalities has reduced considerably. There is no yield reduction and so my revenue is the same, but expenditure came down from Rs.3,000 to Rs.300."* This obviously increased his net income. Previously he used 2 litres of endosulfan per year for 2 acres, which amounted to Rs.600, and now he is able to do without endosulfan or other pesticides along with chemical fertilizers, which saves him money and improves the soil health.

Mr. Siddulu commented that, under chemical management, pest incidence was high and most of the time it was unmanageable. On the other hand, under NPM the pest incidence is low and it is manageable using logical and effective procedures. *"NPM needs extra manpower and care. But it gives confidence, and freedom from external risks. Moreover it creates more local economic opportunities too"*, he observed. *"Since we are maintaining the ecological balance through NPM practices in the village, ours was the only village in this region which was not affected by Chikungunea [a viral fever] which is supposed to be spread through mosquitoes"* he added.



Mr. Putta Siddulu, another farmer from the same village, has a similar story. He stopped cultivating cotton as he did not want to grow Bt cotton. He also said that the NPM process involves additional labour but it is yielding results. He added that people from cities visit the village during the harvest of kharif season (autumn) paddy, and buy rice from farmers directly, paying Rs.28/kg against Rs.20/kg for the same variety in the market. This demand results from people being prepared to pay a premium for rice grown without pesticides.



Farmers turned to NPM following assistance, in 1986, by the Centre for World Solidarity (CWS), a Hyderabad-based NGO headed by Dr. M.S. Chari, in controlling red hairy caterpillars which are a pest of rainfed crops like castor, groundnut, cotton, etc. These used to invade farms in large numbers, despite the use of chemical pesticides, and caused huge losses. The red hairy caterpillars were brought under control, without using chemical pesticides, through effective interventions such as bonfires, trap crops, etc. The successful practices were adopted by other villages as well. Later CWS, with the help of local NGOs, started working in villages to build capacity for Non Pesticidal Management of crops.

The Centre for Sustainable Agriculture (CSA), an offshoot of CWS, took the lead in implementing NPM in a more organised manner through technical support, capacity building programmes, research, campaigns, and marketing. CSA implemented NPM in 45 villages spread over 6 districts in Andhra Pradesh, involving 6,000 acres. This was later expanded by the Government of Andhra Pradesh's Department of Rural Development to cover 3,000 villages (1.2 million acres) across 18 districts. As more land of the 3,000 villages was brought into the programme the area under NPM grew further to approximately 1.7 million acres. This accounts for 5% of total land under agriculture in the vast state of Andhra Pradesh and now the government is targeting 50% coverage by 2014.

## Non Pesticidal Management

Unlike many other community programmes, NPM gathered momentum with farmers themselves taking interest in promoting the system through the sharing of experiences and inputs. With confidence these farmers recommend NPM to neighbouring villages and volunteer to train them. In every village the NGOs have provided technical support, monitoring and follow up.

NPM has demystified pests, pest control and chemical management. It encourages farmers to once again take control of plant protection, from crop planning to pest management. NPM provides farmers with an understanding of the life cycle of different pests, with reference to their crops, and thereby helps them to make timely interventions to avoid crop damage and the use of chemical pesticides.

## ***Principles***

Non Pesticidal Management is based on the following principles:

- Ecological sustainability: NPM advocates no chemicals (since use of chemicals has increased pest infestations), no use of genetically modified crops, and low use of energy and water.
- Economic sustainability: local procurement of inputs eliminates external agencies and allows the money to be circulated within the local economy, which generates more employment and a fair price to farmers.
- Social empowerment: promotion of institutional mechanisms like cooperatives empower local people in planning, decision making and managing markets.
- Safe food: NPM yields toxic free food for people and animals and thus reduces incidence of health problems.

## ***General Practices***

The general practices are as follows, noting that there will be deviations based on crops and seasons:

- Prevention
  - deep summer ploughing of farms to expose the larvae/pupae of many pests to the sun and birds
  - biological treatment of seeds to avoid pests getting into the seed
  - crop planning and spacing between crops to maintain balance of pests
- Precaution
  - soil health is the key; it is reflected in improved productivity and resistance to diseases and/or pest attacks
  - application of tank silt, compost, vermicompost, poultry manure, green leaf manure, and cowdung-based preparations like Panchagavya to improve soil health
  - growing of border crops such as Jowar (a variety of sorghum), the height of which obstruct pest movement
  - growing of pest trap plants, like marigold and castor, to help in pest control
  - pheromone traps and bonfires to attract pests
  - proper planning of crops to reduce the incidences of pest attack
- Management
  - use of neem seed kernel extract, chilli-garlic extract, cowdung-cow urine extract, buttermilk and asafoetida solutions, etc, to serve as pest repellents as well as pesticides
  - provision of bird perches in the farm to help pest control
  - shaking of plants at times, which helps the pests to drop off or become exposed to birds

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### ***Institutional Mechanisms***

NGOs in the region facilitated farmer groups, such as Sri Rama Ryth Seva Sangam, Sri Manjunatha Ryth Seva Sangam and Kakathiya Ryth Seva Sangam, to start saving bank accounts to pool money for the initial investments needed for NPM.

A producer cooperative – Enabavi Sendriya Rythula Paraspara Sahayaka Sahakara Parimitha Sangam (Ltd.) – has been formed, with 99 members, to support the farming activities in the region.

The Society for Elimination of Rural Poverty (SERP), a network of women's self help groups supported by the Government of Andra Pradesh's Department of Rural Development, has decided to upscale the NPM efforts to other parts of the state. SERP has created its own institutional mechanism with the support of local NGOs for implementing NPM.

The Centre for Sustainable Agriculture is giving technical support and troubleshooting help for the farmers, including the creation of a helpline. Now CSA is facilitating the formation of consumer and producer cooperatives to provide better markets for farmers and better prices for consumers. CSA is also examining possibilities for adding value to products to improve incomes for farmers.

### **Endosulfan vs NPM**

Telengana, the region within which Enabavi lies, was known for chemical intensive farming, and endosulfan was used on almost all crops, especially cotton, paddy, red gram, and some vegetables. It was not only used for pest control, but also for a hormonal effect to induce flowering in plants. On average, one litre of endosulfan was being used per acre of land per crop. In paddy fields, it was applied twice a year as paddy has two seasons, at the rate of 0.5 litres/acre/crop.

The following economic comparisons of farms using NPM with farms using endosulfan show that farmers are significantly increasing their net income, as much as 44%, through reductions in input costs, with only minor reduction in yield.

***Table 1: Endosulfan usage***

<b>Crop</b>	<b>Area (acres)</b>	<b>No. crops/year</b>	<b>Quantity of endosulfan (litres)</b>
paddy	50	2	50
cotton	6	1	12
pigeon pea	30	1	60
tomato	4	1	2
tobacco	40	1	40
<b>Total</b>	<b>130</b>		<b>164</b>

Money previously spent on endosulfan in Enabavi per year @ Rs.300/litre  
(164 x Rs.300) = Rs.49,200.

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**Table 2: Crop protection expenditure  
– a comparison from Mr. Venkataiah, Mahabubnagar District, Andhra Pradesh**

Before NPM		Using NPM	
Inputs	Cost	Inputs	Cost
Endosulfan	Rs.900.00	Neem	Rs.140.00
Gamaxine (HCH)	Rs.700.00	Pheromone traps	Rs.30.00
Tracer (spinosad)	Rs.1,060.00	Chilli powder	Rs.20.00
		Garlic	Rs.20.00
		Kerosene	Rs.10.00
		Miscellaneous	Rs.80.00
<b>Total</b>	<b>Rs.2,660.00</b>	<b>Total</b>	<b>Rs.300.00</b>

Source: *Down To Earth*, May 31 2006

**Table 3: Comparison of plant protection costs over whole area under NPM  
(Rs./acre)**

Crop	With pesticides	Using NPM	Savings
Cotton	5,000	1,000	4,000
Chilli	15,000	2,000	13,000
Red gram	1,500	300	1,200
Groundnut	1,500	300	1,200
Castor	2,000	400	1,600
Paddy	2,000	225	1,775

Source: Society for Elimination of Rural Poverty, Department of Rural Development, Hyderabad

**Table 4: Comparison of profits in Warrangal, per acre of cotton**

	Uses pesticides, fertilisers (Jillela Reddy, Kallem Village)	Uses organic methods (Ponnam Mallaiah, Enabavi Village)
Input costs	Rs.15,250.00	Rs.8,550.00
Yield	12 quintals	10 quintals
Gross income	Rs.24,600.00	Rs.22,000.00
<b>Net income</b>	<b>Rs.9,350.00</b>	<b>Rs.13,450.00</b>

Source: *Down To Earth*, January 1-15 2009



## Conclusion

Over 1.7 million acres of land in Andhra Pradesh are now farmed under Non Pesticidal Management. Almost all the important crops in Andhra Pradesh grow in these villages. Villagers are developing, with institutional mechanisms of their own, as service providers and cooperatives, showing that NPM is economically sustainable and well accepted by farmers. Their major achievement is that they are able to avoid the use of pesticides that ate into their income, ruined their crops and soil, and destroyed their health and environment.

Farmers realised from their own experiences that pesticides were increasing pest infestations. They realised that maintaining ecological balance is important to managing pests. The farmers in 3,000 villages in Andhra Pradesh are no longer dependent on external agencies for pesticides, other agriculture inputs, money, or decisions. They are confident about what they are doing and have proven that farming without pesticides is ecologically and economically sustainable, and that endosulfan is not necessary for managing pests.

Like farmers in Enabavi village, many farmers in the other villages are also moving into organic farming. NPM has proven not only to be an alternative to pesticides like endosulfan, but also to be a low-risk stepping stone towards a total cost-effective organic farming system. NPM is also opening up more economic and social opportunities for farmers to rebuild their agriculture and livelihood.

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