

NO PESTICIDES...NO PESTS

The remarkable story of how a village in Andhra Pradesh rid itself of pesticides

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Contents

<i>Introduction</i>	4
<i>The Story Of Punukula</i>	9
<i>The Beginnings Of The Transformation</i>	11
<i>The Initial Hesitancy And Skepticism</i>	12
<i>The Sweet Taste Of Success</i>	13
<i>The Role Of Social Processes</i>	16
<i>The Rapid Spread Of The Approach</i>	18
<i>The Technology That Was Used</i>	19
<i>What Seems To Have Contributed To This Change</i>	21
<i>What About All Those Other Hapless Farmers?</i>	23
<i>The Way Out</i>	25

Annexures

<i>Annexure 1: Pesticides in India</i>	26
<i>Annexure 2: Pesticides in Andhra Pradesh</i>	28

INTRODUCTION

Today agriculture is passing through a difficult phase. The ever increasing costs of cultivation due to excessive dependency on external inputs, high fluctuations in market prices due to opening up of markets, reduced public support after liberalisation coupled with the monsoon vagaries have made agriculture-based livelihoods unviable. The spate of farmers' suicides, particularly in Andhra Pradesh and across the country, is only the tip of the ice-berg. The crisis needs to be understood and several long term initiations have to be made to solve it.

Agri-chemicals, especially pesticides, occupy major costs in crops like cotton, chillies etc. The inevitability of pesticides in agriculture is promoted by the industry as well as the public research and extension bodies. However, a village called 'Punukula' in Khammam dist of Andhra Pradesh has a different story to tell. The village, with around 600 acres under cotton and growing crops like chilli, pigeonpea, paddy, could emerge out of the pesticide trap with efforts put in by non-governmental organisations. The costs of cultivation came down by more than Rs. 10,000 per acre saving a staggering amount of about Rs. 60 lakhs on pesticide bill per annum in the village. This is not just another story of traditional practices but an interesting transformation of how women and men farmers consolidated their knowledge supplemented with modern science, developed their skills, put their labor to effective use and by making best use of nature's products and processes, could replace the external inputs. The village today is completely free of pesticides. Farmers have been able to clear their earlier debts and the general sense of well-being in the village is an indication of the transformation. This village has already caught the attention of state and national media. In the following pages, one can see a passionate case of this village where the farmers say 'Throw out pesticides-pests will be controlled' contrary to what the dominant paradigm thinks and promotes.

The dominant paradigm of pest management largely depends on chemical pesticides. Pesticide sprays are resorted to when the pest is in a damaging stage [in terms of the pest life cycle] and state [in terms of intensity of incidence]. However pesticides being used become ineffective in no time since such a use allows for insects to be selected for genetic resistance rather than controlling them. On the other hand, replacing chemical products by biological products by itself may not solve the problem without a fundamental change in the perspective or thinking towards pest management. The Integrated Pest Management initiatives which have come up as an alternative largely through debates and discoveries about pesticide effects on human health and on environment still believe that pesticides are inevitable, at least as a last resort. The 'alternatives' are now commercialised by the market. One such alternative which has much serious consequence is Genetic Engineering in agriculture. While GE cotton has been released, several other crops are lined up for irreversible releases into the environment. The new markets not only sell the alternate products, but also dictate the methods to be adopted [externally-imposed organic farming certification standards, for example].

Under Non-Pesticidal Management [the approach adopted by Punukula], the primary focus is on replacing the external inputs with the local knowledge, management skills, labour, and effective utilisation of natural products and processes locally available. The farmers understand the pest biology and life cycle and modify the crop management practices to keep the insect population under check, from reaching a pest status.

In the four stages of the life cycle, insects damage the crop only in one stage [larval stage in most of the cases] - atleast two of the stages are immobile [egg and pupa]. The adult stage will not be on the crop. There are several options available to control them at each of the stages mostly using local resources.

All this doesn't require the so called 'expertise' but only accepting and respecting the knowledge and skills of the farmers, supporting them to enhance their knowledge base with a demystification of modern science.

The dominant paradigm which still by and large tries to find solutions in marketable technologies and commodities has to change. The public policy support which encourages such commodities has to change. The research system which has already set its agenda to work and promote such technologies should reorient its priorities and work towards more farmer friendly methods and technologies. A shift in the mindset and a shift in the perspectives of thinking are needed.

What this calls for is a shift in the pest management paradigm currently being adopted.

Contradictions of thought

In all the local languages the poisonous chemicals used in pest management are called 'medicines' [*purugumandulu* in telugu or *aushadhe* in kannada or *keetak davaein* in hindi] while the farmer-friendly beneficial insects, predators and parasites are called natural 'enemies' [*sahaja satruvulu* in telugu] - may be a linguistic change is also essential.

THE CONTEXT

"I don't know how to grow cotton without pesticides - I don't think it can be grown that way..... I ask pesticide dealers about various pests on my land and spray whatever they give me to this day"- Bukya Bheema, ZPTC Member from Kommugudem village, about 25 kms from Punukula, September 2004

We promptly invited him to visit Punukula village to see and believe for himself that chemical pesticides can indeed be done away with. We invite you to read on, even if you cannot go to Punukula personally for understanding and appreciating this transformation.

This is the story of how two villages in Khammam district of Andhra Pradesh put in efforts over a five year period (1999 to 2003) to rid themselves completely of pesticides. Today, the villagers do not use chemical pesticides at all - they are inspiring other farmers in their district and elsewhere to go the same way and improve their livelihoods. The Panchayat is about to pass a resolution that they would remain pesticides-free. Before we narrate this impressive transformation, it is important to understand the concept of pest management as it is being practised today, and the need for a changed outlook.

Shifting Paradigms:

First, the myths in current pest management paradigm:

- **"Pests can be controlled only by killing them"**: this is the gravest mistake that the current pest management paradigm makes – it believes that pests can be controlled only by killing them. The pesticides and pesticide incorporated plants (for eg. Bt cotton) are based on this wrong premise. They all act only on larval stage when the damage already starts happening. A pest outbreak is waited for, after which powerful pesticides are brought in. This is only a "curative" attempt rather than a "preventive success".
- **"All insects in the field are pests"**: there is an indiscriminate outlook towards the various insects that are present in an agricultural field and around it. Even though the modern science is talking about the natural enemies the pesticides they produce and promote kills all the insects indiscriminately. This obviously destroys the natural predators of the pests also. When the ecological balance is thus destroyed, the pesticide-resistant pests take over.
- **"No relationship exists between mono-culture and pest incidence"**: the current pest management paradigm either does not appreciate or chooses to ignore the relationship between monocultures and pest incidence. It is well-established that such mono-cropping over large contiguous areas, reduced genetic base with mono-culturing germplasm results in an unobstructed proliferation of the pest. Now with the Pesticide incorporated plants have made these monocultures to gene level, trying to put 'Cry genes' against all pests across crops.

- **“Chemical fertilisers and pest incidence are not related”**: though it is scientifically known that a plant’s vulnerability to pest incidence is higher with the use of chemical fertilisers (due to increased ‘succulence’ in the plant), the connection is not made in real life. Pests are sought to be dealt with in isolation to the land fertility management issues. This is a classic example of the reductionist views that modern science can take

- **“Pest resistance is a genotypic issue rather than an environmental one”**: there is much research going on to develop varieties of plants that are pest-resistant by playing around with the genes. The game plan is obvious here – genes will go hand and in hand with intellectual property rights, which in turn ensure secure markets and profits for the industry. Pest resistance therefore is made a genotypic issue rather than one that involves broad ecological management in the farm. That is where Genetic Engineering in agriculture also finds its space. In this narrow perspective, what is not understood is that the problem only gets accentuated especially in pest-resistant GE crops when other environmental factors related to the pest’s life cycle etc., are not managed.

- **“Resistance management is about using newer and newer generation pesticides” [as per the industry], and “about using more pesticides, including mixtures of upto five pesticides” [as per the farmers]**: The way to get around the problem of resistance is usually seen in inventing newer and newer molecules by the industry. In a patent regime, such newly developed pesticides mean more profits through secure markets. First came the OCs [organochlorines], followed by the OPs [organophosphates] and Carbamates, followed by the much-touted Synthetic Pyrethroids. Each generation’s problems were sought to be solved by the next generation, only to end up by creating more problems. The cost went on increasing for the farmers. A 100 ml. pesticide of the newest generation can cost upto Rs 1000/ per container. The industry continues to grow at 4-5% per annum. However, the older molecules which were found to be problem-causing or ineffective were not removed from the scene. For some farmers, the way out is to mix four to five different pesticides and spraying them together – no one knows the ecological and health disaster that such desperate measures might be causing!

- **“Prevention of pest/disease incidence is about spraying pesticides even when the pest is not present”**: Farmers in many parts of the country have made pesticide spraying a part of their daily routine – they take a tanker on their back to go and spray pesticides in their fields...”just in case”. Pesticide use is no longer related to a pest and its manifestation in the field. Prevention is understood as spraying regularly, as per a schedule drawn up by the farmer or his industry-advisor irrespective of whether such treatment is needed or not

- **“The benefits from the use of synthetic pesticides outweigh the risks”**: Finally, it is genuinely believed by many in the scientific establishment and the industry that the benefits from the use of synthetic pesticides outweigh the risks and problems associated with it. However, this is simply not true. It might appear to have an advantageous cost-benefit ratio given their simplistic and reductionistic economic calculations. In fact, the suicides in the cotton belts of the country prove that

even the economics has turned adverse with pesticides. However, complete calculations of the entire social, economic and ecological disaster that pesticides have created, especially in the face of safer alternatives, instructs us that the risks and hazards far outweigh any probable benefits.

The message is clear - 'Nature makes insects, humankind makes pests'.

The approach that needs to be taken towards pest management, to ensure economic, ecological and social benefits to farmers is completely different from the above, of course.

Such an alternative non-pesticidal approach recognises the importance of the following:

- that natural insect balances in a farm are important to control what we consider as 'pests'. For this to happen, the fields cannot be in a toxic-contaminated state
- that pest life cycles have to be understood and pest management has to begin right from the beginning - before the eggs are laid. Several steps along the way at each stage are needed. This understanding includes close pest surveillance and decisions based on the incidence
- that crop diversity plays an important role in pest management; in that sense, seeds play an important role and therefore, control over seeds by the farm communities. Trap crops and repellent crops have a role to play too
- that local and naturally-occurring materials can be used for pest control; this will also have its own political-economy dimensions which are of benefit to the farmers
- that since many of the pests are polyphagous, these pest management principles have to be applied across different crops and at a particular scale, for maximum benefits
- that soil nutrient management in organic ways plays a crucial role in the plant's ability to withstand pest and disease incidence
- that a new paradigm of pest management can not only benefit the farmers economically and ecologically but can also address certain developmental and social issues including gender
- that such pest management need not result in decreased yields, as it is usually made out to be
- that such pest management principles and practices are pretty often drawn from farmers' experiential knowledge

It is on such an alternative vision and paradigm that the villagers of Punukula and Pullaigudem have achieved their successes and are now a source of inspiration for others.

THE STORY OF PUNUKULA

Punukula is a small village 12 kilometers from Kothagudem town in the Revenue village of Payakari Yanambailu (consisting of Punukula, Devijatanda, Pullaigudem, Poosaltanda and Kodipunjulavagu) in Palvoncha mandal of Khammam district.

The village consists of 189 households with the population being around 860. There are 128 cultivators and 51 agricultural wage labourer households in the village. Other households are engaged in other occupations. The majority of the families belong to the Yadava community and other BC castes, followed by STs [Lambadas and Koyas]. There are also some SC families in the village. In terms of housing, there are equal number of pucca houses and thatched houses in the village, in addition to some tiled houses. As the above data indicates, agriculture is the mainstay of this village, like thousands of villages in India.

PICTURE OF MILESTONE

Punukula was not a cotton growing village traditionally. About 15 years back, two-three families of farmers who migrated from Guntur district brought cotton into Punukula. Earlier to that, the villagers grew pigeonpea, jowar, greengram etc.. A few farmers like Margam Muthaiah decided to imitate the Guntur farmers and went in for cotton cultivation. "I had not seen or used pesticides before then. When I asked the Guntur farmers what it was that they were spraying on their cotton fields now and then, they would not tell me". However, realising the market potential, pesticide industry began its marketing efforts here. The farmers, who were mostly illiterate and not supported by agriculture extension department, would rely on the pesticide dealers to suggest to them which pesticide is to be used, when and in what quantities. Very soon, they were trying several pesticides on their cotton crop. Some of the farmers lost count of the number of times they were spraying, or what they were spraying. However, the pest menace did not decrease.

The villagers of Punukula began using large quantities of pesticides on other crops too by this time. They were spraying deadly chemicals on chillis, on pigeonpea and on paddy. Pesticide use on chillis meant discoloration of the produce - this brought down prices by nearly half! However, the farmers did not connect it to pesticides. What should be pointed out here was that their approach to pest management was to start controlling the pest after it erupts in its larval stage, and not begin earlier.

There were a number of accompanying problems. This included many acute poisoning cases in the village, of even people who died due to pesticide exposure, of suicides of debt-ridden farmers and so on.

Payakari Nageswar Rao committed suicide 5 years ago, in 1999. He used to grow cotton year after year on his land. He could not repay the 70,000 rupees of debt that he had run up with the local "all-in-one" dealer. When the money lender pestered him for repayment, Nageswar Rao saw no option but to commit suicide. He drank those very pesticides which accentuated his problems enormously. His wife Veeramma now leases out part of the 3-acre

land that they own since she cannot manage it on her own. She however continues to grow cotton on the land. To this day, she has not been able to repay her husband's debt fully.

[PHOTO OF PAYAKARI VEERAMMA](#)

Others like Korsa Veeramma's husband and Koram Buchaiah of Pudukula and Muthaiah of Pullaigudem died because of exposure to pesticides during spraying. There are others who have had to spend a good deal of money for treatment and medical care after acute intoxication from pesticide exposure. For instance, Banoth Mansingh and Maloth Srinu.

Maloth Srinu, son of Hemla Nayak, a young man of 21 years was severely poisoned four years ago when he mixed phorate granules and sprayed it the whole day. He fell unconscious at the end of the day and had to be referred to Dr Nagaraju in Kothagudem for treatment. He was in a coma-like state for two full days and everyone expected him to die. After nearly two weeks in the hospital, he was able to recover. His treatment costs amounted to around Rs 18 thousand. He now vows never to go near a pesticide tank again. [PHOTO OF MALOTH SRINU](#)

Man Singh (35) is considered a "crack" [mentally unstable] by many in the village. He himself can recollect that he had gone unstable due to an acute poisoning instance. He was using a mixture of Quinalphos and Cymbush in the year 2000 when he fell down in the field. He recalls that it took him three months to recover and a good deal of money spent. [PHOTO OF BANOTH MANSINGH](#)

The RMP [Registered Medical Practitioner] of Pudukula, Mr Madhu recollects that there used to be atleast 50 to 60 poisoning cases per season earlier to 2000. He would treat many cases, and would also have to refer the more serious cases to the town hospital.

The economics of farming went out of control. They seemed to have gone straight into somebody's else's hands however. The "single window, all-in-one" dealer. The 'dealer' was indeed dealing a death blow to the farmers' dreams. He would be the one who would sell them seeds, fertilisers and pesticides - he would give these on credit to the farmers and even supply other credit. However, all of this was at high interest rates of 3-5% per month. Since the farmers were in no position to repay these loans, the agreement would be to sell their produce to this "all-in-one" dealer. The dealer in turn would inevitably fix the price at rates lower than the market value. The farmers had no choice but to accept the rate, in the hope that next year's investments would once again be supported by the dealer. The cycle became extremely vicious with no way out. The farmers were now truly on the Pesticides Treadmill.

Most people in the village recall with horror the strong clutches of the all-in-one dealer. The social stigma of indebtedness, especially at those times when the money lender put pressure for repayment is unbearable for many. Payam Nageswar Rao had to commit suicide as an escape from this trap.

THE BEGINNINGS OF THE TRANSFORMATION

In 1999, the local Non-Governmental Organisation, SECURE (Socio-Economic and Cultural Upliftment in Rural Environment), which was implementing a watershed project under DPAP approached the villagers of Kodipunjulavanipalem, three kilometres from Pudukula to go in for Integrated Pest Management in cotton. This was undertaken as part of an ICRISAT project. Some farmers came forward and they were trained in IPM. Given some positive results here, in the next year, the organisation decided to start Non-Pesticidal Management (NPM) approach in cotton in Pudukula village. Earlier analyses with the villagers about their

About SECURE:

The NGO started work in 1991. The vision of the organisation is 'integrated tribal development through participatory natural resource management and women empowerment'. Over the past decade or so, SECURE has been working for sustainable tribal development through interventions focused on child development, women empowerment, promotion of alternative income sources, preventive healthcare, collective action through SHGs and NIM. Their project area is located in Palvancha mandal of Khammam district.

livelihoods revealed several problems related to their agriculture including lack of support for investment, higher investments each year, lack of marketing support, indebtedness etc. Realising that pesticides in cotton were playing an important role in the crisis, the organisation decided to work on the issue. However, the farmers were not ready to give up cotton cultivation. Even if it meant several problems, the farmers saw the crop as a good source of income generation in years that it yielded. The NGO also saw this as an opportunity. If pesticides can be eliminated in a crop like cotton (with its intensive use of pesticides), then the convinced farmers will automatically give up pesticides in other crops, SECURE felt. For strategic reasons, it also decided to concentrate on one or two villages like Pudukula.

The NPM project was with the technical and financial support of the Hyderabad-based Centre for World Solidarity's Sustainable Agriculture wing (now called the Centre for Sustainable Agriculture). When CWS was scouting around for areas and partners to begin an NPM programme, SECURE offered to initiate the project in their work area.

SECURE was already working in Pudukula on a watershed project. There were five strong women's Self Help Groups as well as a strong Watershed Committee under the capable hands of Hemla Nayak. In 2000, with a great deal of persuasion by SECURE, 20 farmers agreed to be part of the programme and try out NPM. The farmers participating in the programme were very reluctant as well as sceptical about the efficacy of the NPM approach.

THE INITIAL HESITANCY AND SKEPTICISM

"When we began work, it was very difficult. Everything that we were saying was against the existing (market) forces which were quite powerful", recalls Mr Venu Madhav of SECURE.

[PUT PHOTO OF VENU MADHAV](#)

"We scoffed at their idea of giving up pesticides to control pests, since the most powerful of pesticides were also unable to control pests!", says Margam Muthaiah. "The idea of neem for pest control was funny - we would wonder how neem that we use to brush our teeth be able to control these many pests", adds Hemla Nayak.

When SECURE personnel approached the farmers with their non-pesticidal technology, the farmers used to laugh at them. This, they were doing in the face of aggressive marketing including advertising by the pesticide industry and the difficulty in the challenge is entirely understandable.

CWS and SECURE persisted in their efforts. On the one hand were farmers who refused to believe that anything like neem or chilli-garlic would work when even deadly pesticides were proving ineffective against pests. On the other hand, there were many farmers who were completely fed up with the situation that they were in. They were ready to check out the alternatives. There were trainings organised for such farmers.

In fact, just as the Green Revolution extension personnel are supposed to have done for chemical fertilisers in those initial days, SECURE extension workers (two of them - one man and one woman - placed in Pudukula) would themselves go into the fields and show them the use of alternative technologies while the farmers watched. They brought neem seed kernel to the village and made the extracts in front of the farmers and used them. Similarly, they made the chilli-garlic extract and demonstrated how to prepare it, when and how to use it. The farmers, especially the women, appreciated how easy the preparation of the extracts was. The participating farmers used these extracts replacing the pesticides completely, and they found to their delight that even the bollworm could be controlled.

THE SWEET TASTE OF SUCCESS

At the end of the first year, the positive results were already apparent with the IPM approach:

IFAD-ICRISAT project for IPM in pigeonpea and chickpea, 1999-2000 in the SECURE project area incl. Punukula:

Farmers	Area (ha)	Cost of plant protection		Net Profit	
		IPM	Non-IPM	IPM	Non-IPM
45 (3 villis)	50	213	1108	5623	2411

In 2001-02, Non-Pesticidal Management work was taken up on 6.4 hectares, with eight farmers in Punukula on cotton, while in the case of pigeonpea, it was done in 7 ha with 3 farmers. The approach now was to completely eliminate the use of chemical pesticides in the cultivation, one step forward from even IPM.

Once again, in the non-NPM plots, farmers experienced a negative income while the NPM plots saw yield of seed cotton range between 10 quintals/ha to 18.75 quintals/ha. The average plant protection cost incurred by NPM farmers was Rs 4301 per hectare, and the average net income was Rs. 3420 per hectare.

NPM in Cotton during 2001-02 (on 6.4 ha, with 8 farmers in Punukula)

Avg. Yield (q/ha)		Cost of Plant protection (Rs/ha)		Net Income (Rs/ha)	
NPM	Non-NPM	NPM	Non-NPM	NPM	Non-NPM
15.62	14.72	4301	8596	3420	-5201

By the second year, more farmers joined the effort as they had witnessed the good results first hand in the fields of the first year's participants. Farmers were also taken on exposure visits to Warangal. There were more training-workshops held in the village. Slowly, word spread, and along with it, a serious conviction that getting rid of chemical pesticides is the only way out.

By 2002-03, the NPM concept in Punukula was tried out with a much larger number of farmers, in crops like Paddy, redgram, cotton and chilli. The number of participating farmers went up to 59, with an area of 58 hectares under NPM approach to crop cultivation.

The increased net incomes were to the satisfaction of the farmers.

In 2003-04, the acreage under NPM cotton went up to 1200 acres in Punukula and Pullaigudem villages, covering all the cotton area of Punukula. The average yield per acre was 12 quintals, with the cost of cultivation hovering around Rs 8563/acre. The net income per acre touched Rs. 16637 per acre. In the 10 acres of NPM tried out in Chilli that year, the average net income was Rs. 23410 per acre. This was unheard of by the villagers in recent

times. In Chilli, the discontinuation of pesticides also meant a great improvement in the quality of chilli and therefore, the produce fetched higher prices in the market.

Village	Acreage	Average Yield per acre	Average Cost of Cultivation per acre	Average Net Income per acre
Punukula and Pullaigudem	1200 acres	12 quintals	Rs. 8563/acre	Rs. 16637/acre

In 2004-05, for a second year in a row, nobody in the village has gone anywhere near a pesticide dealer or dabba. The Panchayat is ready to pass a resolution to announce that it is pesticides-free and would continue to be so. From the Panchayat's side, they would like to request pesticides dealers not to come into their village and market their products.

Mr Thati Hanumanth Rao, the Sarpanch, says that the resolution would ask the pesticide companies to stop visiting their village, sending their vans for advertising or selling pesticides to the villagers. They would work through the ward members to ensure that farmers do not use pesticides on their crops. The Panchayat also wants word of their success to be spread elsewhere. They are ready to go to other villages and dialogue with the farmers there to urge them to give up pesticides. [PUT PHOTO OF SARPANCH](#)

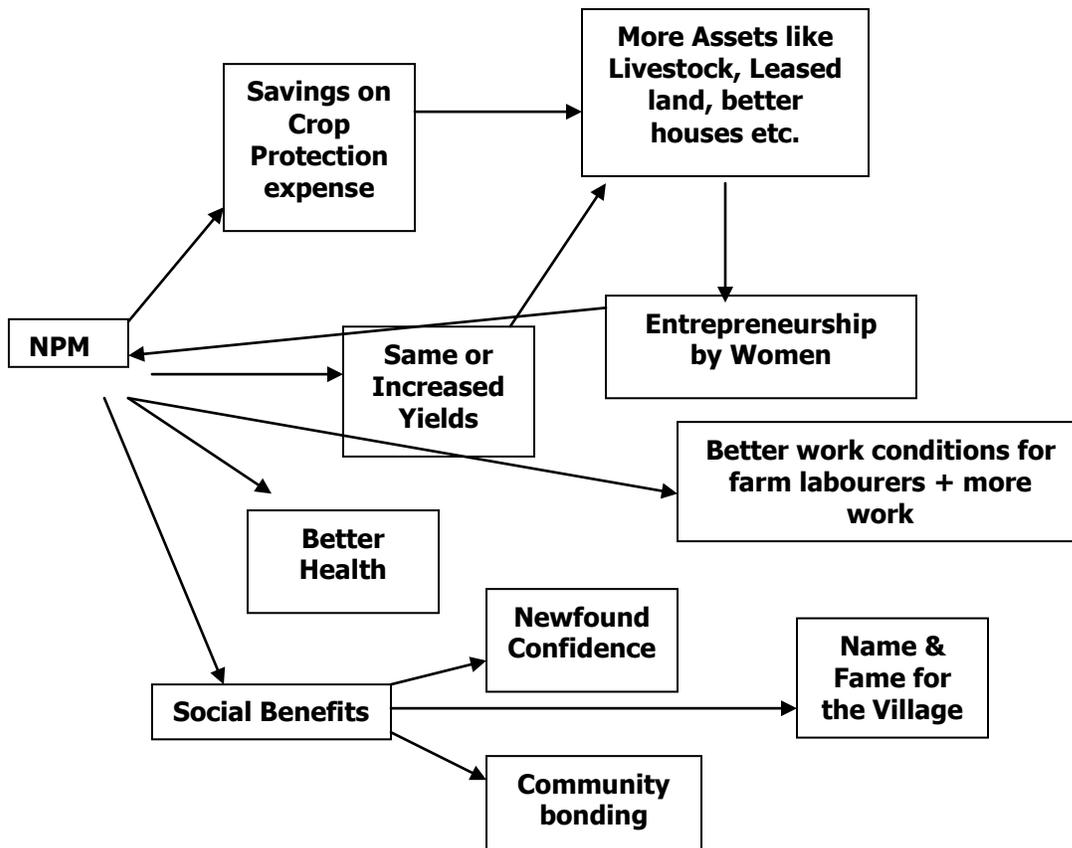
Farmers of the village were able to get rid of past debts in a couple of years' time. With the debt burden off, the farmers are willing to try out more and more ecological approaches, as well as try it on more crops. Eerla Dhanamma now bought two more acres of land, after switching over to NPM, for instance. Hemla Nayak says that his debts have been repaid. Man Singh has been able to lease in 2 acres of land on which he is cultivating cotton without pesticides. Field Staff of SECURE point out the various changes - including housing - in the village after pesticides have been removed from their agriculture.

The ecological balance in the fields got restored. There are many more insects present in the fields, without any of them reaching a "pest" stage of threat. Dhanamma talks about spiders, wasps and beetles returning to their fields. Birds are returning to the village, the villagers report.

The health of the farmers improved - there are no more any cases of acute intoxication from the village. Earlier, each such case would cost anywhere between one to two thousand rupees for the local RMP (Mr Madhu) to treat them. More serious cases would be referred to Dr Nagaraju in Kothagudem town. Such cases would easily cost atleast four to five thousand rupees. Now, the farmers have been spared this unneeded cost. Dr Nagaraju of Kothagudem also observes that acute intoxication cases from these villages have come down.

For the agricultural labourers also, things have improved on many fronts. There was a wage increase from 25 rupees to 30 rupees during the corresponding period [when NPM was practised]. They do not have to be exposed to deadly pesticides now, nor incur medical care

expenses for treatment of pesticides-related illnesses. Some point out that there is even more work for the labourers - in the collection of neem seed, in making powders and pastes of various materials and so on. Farmers are even leasing in land and putting all lands under crop cultivation these days - this implies greater employment potential for the agricultural workers in the village. PUT PHOTO OF THREE WOMEN IN THE FIELD [FARMWOMEN]



THE ROLE OF SOCIAL PROCESSES

FARMER TO FARMER: SECURE had organised a trip for some villagers to visit a village in Nalgonda district where another NGO was helping implement N PM. This clicked with Margam Mutthaiah, 60, an influential village elder with 1.2 ha of land, and the first to opt for N PM in 2001. "I had nothing to lose. I owed Rs 1,20,000. One season, I spent Rs 18,000 on chlorpyrifos, monocrotophos, endosulfan and other pesticides." His crop yield in 2001 was no different from those who used pesticides. Mutthaiah, whose debt -to a cooperative bank -is now down to Rs 31,000, says there isn't any fallow land in the village anymore. Earla Dhanamma and Hemla Naik were among the first to follow Mutthaiah. In the past two years, Naik's cost of cultivation has fallen down from about Rs 60,000 per hectare to Rs 10,000.

The biggest coup came when N Venkateshwar Rao, a farmer of neighbouring Pullaigudem village with about 30 ha of land, didn't use any pesticides in the last season. The sweet irony is that he owns Anant Laxmi Fertilisers, a shop selling pesticides on credit. He said he stopped using the chemical pesticides because of a chain reaction in surrounding villages. This way, he saved Rs 6,00,000. [PUT PHOTO OF DEALER VENKATESWAR RAO](#)

"They saw other farmers practice N PM. That meant more than all our talk,"
Venumadhav, SECURE.

"India seems to have forgotten that the Green Revolution succeeded due to rigorous extension work and farmer-to-farmer contact" : Dr Ramanjaneyulu, Centre for Sustainable Agriculture

*- Extracted from "Village Pudukula's Different - Managing Yields Without Pesticides",
in Down To Earth, July 15, 2004*

It is very important to note here that the transformation did not come about easily. It required intense, daily efforts by the NGO initially. Important also were the inputs provided by the Watershed Association and the women's Self Help Groups. The women in the SHGs, for instance, warned their men against going to the market for procuring pesticides. They put pressure on the farmers. They took active part in the trainings being organised by the NGO. They started experiencing and observing the difference between using chemical pesticides and the ecological technologies for pest management.

After they got convinced about the efficacy of the NPM technology, the women were willing to put in some extra work in procuring material, creating various "extracts" for spraying and so on. They would discuss the state of their crops in the meetings and get extension advice about what needs to be done. Today, the women proudly say that they "feel much more confident now. The men listen to us. We are able to save money and improve our living".

Similarly, the farmers' sanghas organised by SECURE were used actively for constant extension, surveillance of crops and active dissemination of solutions.

The women's groups bought a neem seed crushing unit in Pudukula in 2004. This was done through the Panchayat with the help of Centre for World Solidarity. Two women find full-time employment running this machine.

THE RAPID SPREAD OF THE APPROACH

By 2003, all the farmers in Pudukula and Pullaigudem had given up pesticides in their farming. They found that this made a massive difference to their farm ecologies. In Pudukula, 174 farmers along with 120 farmers from Pullaigudem soon became capable of explaining to others the principles behind the new pest management approach and about how they were benefiting. Word spread both in sporadic ways and in a structured manner. Pudukula farmers themselves decided to pro-actively spread the NPM message to nearby villages. Every relative that visits the village gets to hear about the transformation. Similarly, when Pudukula farmers go to other places for other social purposes, they make it a point to bring up their story of NPM.

In neighboring Kodipunjulavagu, farmers have given up pesticide use in cotton crop. Only in paddy do they continue to use pesticides once or twice. This meant a decrease of about 80% in their pesticide consumption, they say. In Prabhatnagar, farmers have slowly begun listening to the words of SECURE. Many farmers are coming forward to try out alternative approaches. Across the stream in Pandurangapuram, farmers have learnt from each other to give up certain kinds of pesticides. The abuse levels have come down drastically. The success of Pudukula and Pullaigudem is slowly spreading on its own.

Vadlamuni Nageswar Rao from Singarayapalem in Kunijerla mandal had come to Pudukula village in connection with a 'caste panchayat' in September 2004. He had to spend one night in the village and then, he got to know that the village was indeed unique - that it had stopped using pesticides altogether. The next morning, Nageswar Rao waited for his friends to arrive from Singarayapalem [about 65 kilometres away] and the group went around the lands to see for themselves whether this was true. They found to their pleasant surprise that the crops were free of pesticides - these were crops sown at the same time, on similar kinds of lands as their village. In their village, there was a huge infestation of pests this season and farmers had already sprayed pesticides like Avaunt and Tracer some 4 to 5 times. Nageswar Rao was highly impressed with what he saw in Pudukula. He spoke to more villagers and tried to understand the transformation. That evening, when he left Pudukula, he went back as a very inspired man. He also bought neem seed powder from the women's groups and is keen on coming back with more farmers from his village. "After I came here and saw the non-pesticidal cultivation practices here, I understood how easy agriculture could be for farmers. We have unnecessarily complicated our farming", he says. He also feels that given the slightly more prosperous and 'progressive' state of his village, following the Pudukula practices would not be difficult at all. [PUT PHOTO OF KUNIJERLA NAGESWAR RAO](#)

There are hundreds of farmers from other places visiting Pudukula regularly in an effort to save themselves from a crisis situation. All of them go back inspired, with a ray of hope born inside them and with an urge to follow a similar path in their own villages.

THE TECHNOLOGY THAT WAS USED

The main principles underlying the technology were:

- there is a natural ecological balance required for control of insect populations before they assume the proportions of being pests - that nature can restore such a balance if it is not meddled with too much
- that understanding the life cycle of an insect is important to manage pests - it is not enough if reactive sprays are taken up once there is a pesticide outbreak. The preventive aspect, of preventing large scale egg-laying, of larva formation, of luring the pest away from the main crop etc., are very important
- crop diversity and soil health play an important role in pest management
- that pest management is possible with local, natural material - the availability of such material or affordability is not under question. This increases self-dependency of farmers and does not put valuable resources of farmers in the hands of outsiders

Based on these principles, the following practices are followed under the NPM method:

- deep summer ploughing
- light traps and bonfires to attract moths
- yellow and white sticky boards in the fields
- manual removal of the leaf surfaces on which heavy egg-laying took place
- pheromone traps for pest incidence surveillance
- neem seed kernel extracts and chilli-garlic extracts to control bollworm and sucking pests
- for controlling aphids and jassids - cow dung and urine extract
- Castor and Marigold as trap crops

Dr. M. S. Chari, who initiated the NPM work from Centre for World Solidarity in different districts and across different crops says:

- the NPM technology requires people to work collectively for the best results - one or two isolated attempts will not be optimal
- since the cost of crop protection through pesticides for most crops is upto 30-40% of the total cost of cultivation, if you reduce the use of pesticides, it is a great profit for the farmers
- deep summer ploughing is very important - this not only destroys the initial stages of a pest, but takes care of water and moisture conservation
- weeding is very important for a crop and this has to be timely
- quality of seed used is also a very critical parameter and farmers should be careful about the seed they use
- applying organic manures and matter in the soil is very useful - while this takes care of building soil structure and adding fertility, it also helps in moisture retention; chemical fertilisers are usually thought to add to the yields and are applied indiscriminately. These in turn increase the pest incidence on the crop
- starting to spray pesticides as soon as one spots one or two pests is a wrong approach - a farmer should be able to assess whether pests are above or below a

- particular threshold level before resorting to some mechanism to control them
- natural enemies should be allowed to grow in the fields by keeping it non-chemical
 - store around 40 to 50 kilos of neem seed in the right season. There are many uses for it and you can use it as and when you need. Firstly, preparing neem extracts etc., is not a bothersome process [no smell etc.]; it can be prepared at home; and it does not involve great costs for the farmer. Neem leaves can be used for grain storage later on
 - 3% neem oil is also good for certain pests
 - neem cake application to the soil is good - it not only controls pests but also adds nitrogen
 - similarly, chilli-garlic extract can be prepared at home and does not cost much
 - cow urine and dung extract has both pest repellent qualities as well as growth regulation abilities
 - different virus extracts can also be prepared by women and sold to others as an Income Generation Activity, as is happening in a few places at present
 - Village level production of some of these materials, with the Panchayat as the node overseeing this is an important approach

PUT PHOTO OF DR CHARI

"With the pesticides gone, the pests have also disappeared - No pesticides, no Pests" - Earla Dhanamma, Pudukula PUT PHOTO OF DHANAMMA

WHAT SEEMS TO HAVE CONTRIBUTED TO THIS CHANGE

An analysis of the transformation points out to several factors that have contributed to the change. The role of social processes beyond the role of simple technology transfer cannot be overstated. Some of these factors include:

- the readily organised groups in the village
- the efficacy of the method - the establishment of the technology - it gave the farmers not just savings on the cost of cultivation but kept their yields in tact, if not increased the yields. Net incomes of the farmers increased. The farmers were able to get rid of their earlier debts. The relief this brought allowed them to spread the technology to other crops
- women being included into trainings and being treated as farmers - they were involved in perspective building and they showed their mettle when it came to firmly using their newfound knowledge
- the intensive extension support provided by the NGO by stationing two personnel in the village
- farmers' own experiential learning, rather than bookish-knowledge-dissemination by outsiders
- farmer-to-farmer extension work
- right timing for interventions - the frustration levels with pesticides and various agricultural problems were so high that the organisation stepped in with alternatives at the right moment
- participatory problem analysis - constant dialogues with farmers about the progress that they were making
- an intensive anti-pesticide campaign in the village - leaflets on the subject, an audio cassette on the subject played in meetings etc.
- alternatives and their preparation put up as wall writings in a prominent place
- more and more visitors coming into the village and sharing their own problems convinced Pudukula visitors that they were on the right track

Today, the lateral spread of the Sustainable Agriculture Programme [by 2003-04] by sustained intervention from various organisations supported by Centre for Sustainable Agriculture/Centre for World Solidarity is apparent from the following table:

NGO	Districts	No. of Villages	No. of farmers		Acreage
			Men	Women	
PEACE	Nalgonda and Medak	5	150	150	350
GMM	Nalgonda	3	181	85	128
CONARE	Mahbubnagar	4	60	75	70
CROPS	Warangal	10	1280	1280	3285
MARI	Warangal	14	160	164	392
NAVAJYOTHI	Medak	10	120	141	323

SECURE	Khammam	2	240	260	1200
DDS	Medak	41	-	210	305
CEAD	Adilabad	3	50	18	250
	6 districts	92	2241	2383	6303

Outreach by partner-NGOs, in turn was tremendous. Each year, hundreds of other farmers were inspired and trained by the NPM farmers in the project villages. The following table gives a picture of such an outreach in just one year - in 2003-04

Partner NGOs	No. of non-partner NGOs reached out to	No. of villages	No. of trainings offered	Acreage	No. of farmers covered	
					Women	Men
CROPS	6	23	29	249	1159	1342
MARI	7	7	7	130	156	125
PEACE	10	10	13	449	413	72
CONARE	01	01	2	50	20	15
SECURE	15	21	11	84	190	165
NAVJYOTHI	-	14	7	213	49	173
CEAD	-	2	13	40	135	125
DDS	-	80	6	-	240	-
	39	158	88	1215	2362	2017

WHAT ABOUT ALL THOSE OTHER HAPLESS FARMERS?

Meanwhile, just 15 kilometres from Kothagudem, in a village called Kommugudem in Julurpad mandal, it is business-as-usual. The distress levels of farmers are visible here. The pesticide dealers' shops in Sujatnagar are packed with farmers of all kinds by around 7.30 am, soon after the shops open. The farmers are queuing up to ask the dealers what they should spray for a variety of pests that are damaging their crops - *penu banka, doma, paccha purugu, bontha purugu, mudatha*...the list goes on. The dealers are busy selling newer and more expensive pesticides - "proclaim", "avaunt", "tracer", "pride", "confidor" and so on. We went into the fields and found that farmers had already sprayed pesticides some 3 to 5 times but without much use.

Bukya Mangthya had sown RCH2 Bt cotton believing the propaganda. He had planted only one row of refugia around the Bt cotton field. The crop was slightly more than 60-days old on the day of our visit - however, pest incidence was visible. Even the bollworm against which Bt cotton is supposed to work as an in-built toxin made its appearance and was merrily damaging the flowers and young bolls. "I had already spent so much money (Rs. 1600/-) on the seed and had followed their instructions. But the pest has come on this field also. What should I do now? Do you think I should approach someone?", he wanted to know. [PUT](#)

[PHOTO OF BUKYA MANGTHYA](#)

Other farmers were seen spraying on chilli crop also. On chilli we were told that farmers sometimes spray every second day for around ten times before a fungal attack can be checked.

The health impacts of pesticides were haunting these farmers. We asked around four farmers in their fields if they had ever experienced any problems and all the four had been poisoned by pesticide exposure at some point or the other. One of them had been hospitalised last year.

The contrast with Pudukula could not be starker. There were signs of the "pesticide trap" everywhere. Containers and packets of pesticides lying around in the fields - new pesticide dabbas sitting in courtyards of houses - tractor-sprayers already moving about in the village - the ominous hum of power sprayers as a constant background noise - unregulated advertisements and marketing of pesticides on every possible surface - fields full of pests and farmers full of despair and frustration.....

The biggest farmer in the village who is also the ZPTC member, Mr Bukya Bheema was so deeply imbibed into the pesticide technology that he refused to believe us when we told him the Pudukula story. He did not think that cotton can ever be grown without chemical pesticides. He had already sprayed 4 times this season. He says that other farmers in the village sometimes spray upto 50 times a season! The average bill on pesticides could be anywhere between ten to fifteen thousand rupees per acre, as per his estimate. While this is the cost just for crop protection, yields have stagnated in the past 3 years or so [the

same period that saw Punukula farmers increase their yields steadily]. Last year, the best yields were only around five quintals, according to him. This indicates net negative incomes for the farmers here. He admits that around ten people are referred to doctors every season for acute intoxication problems with pesticides. Each such treatment costs anywhere between five to ten thousand rupees with the private doctors. Meanwhile, the pests and the pesticide industry continue to have a field day.... PUT PHOTO OF BUKYA BHEEMA

Kommugudem is not an isolated case. There are hundreds of such villages in various districts of Andhra Pradesh which are vexed with the problem of pests on their crops but are not provided with any option other than to turn to the pesticide dealer for inputs and advice. When will they go the Punukula way?

THE WAY OUT

Punukula has shown that with collective action and adequate and appropriate support from outside, pesticides can indeed be done away with. In this context, it is important that the message of Punukula is taken to other places, and lessons learnt here put to good use elsewhere too. Our demands to the Government are:

Policy Level:

- accept that non-pesticidal management is possible, with net incomes still maintained high and yields stable if not more
- get agricultural university researchers to document and validate this
- that in those places where pesticide abuse has reached a disaster level, and in cotton growing belts, begin pro-active dissemination of the ill-effects of pesticides including the health and ecological effects
- aggressive marketing of pesticides in these areas be banned
- the government take up pro-active publicity/hold village meetings etc., on NPM - use the radio, newspapers, newsletters, posters/leaflets, television and so on - ask other villages to try this out
- announce incentives to those villages which are willing to become pesticide-free
- disallow seed treatment with chemicals in crops like cotton - the choice of treatment should be left to the farmers
- take up rehabilitation of all the women who have been widowed either due to suicides by their husbands or because their husbands have been killed due to pesticide exposure

Programmatic Level:

- institute insurance coverage for the transition period
- scale this up to a mandal level model with the government agricultural system taking this up - this includes allocations for communication materials, trainings, farmer-farmer dissemination, organising of farmers' associations, support for provision of alternative inputs, labour costs, transaction costs etc.
- create simplified community certification systems (certified by communities if need be) in these areas and extend marketing support for pesticides-free produce
- make Punukula as a model village - make farmers here as resource people for various pesticides-affected communities in the state and elsewhere. Help them learn the lesson that "No pesticides (means) No pests"
- create marketing support for the non-pesticidal cotton being produced including the setting up of a ginning mill for such cotton

Annexure 1: Pesticides in India

Synthetic pesticides first entered India in the form of DDT and BHC in 1948. These were the first generation organo-chlorine pesticides known for their persistence and numerous adverse impacts that they cause. In 1954, a DDT production unit was gifted to India by the World Health Organisation. Starting from that period, pesticides saw a tremendous increase in their manufacture and production in the country. From 2353 Metric Tonnes of technical grade material consumed in 1955-56, the consumption reached 47020 MT in 2001-02¹. There are around 182 pesticides registered for use in the country right now, and hundreds of formulations. Like elsewhere, this country saw several pesticides showing their true colors in a few years after their release and constant attempts by the industry to replace these harmful pesticides with newer and newer ones. Organochlorines were followed by Organophosphorus and Carbamate pesticides. These were then followed by Synthetic Pyrethroids. It took very little time for the Synthetic Pyrethroids to become ineffective too. Newer pesticides like nicotinoid ones are now coming into the market. The health and environmental effects of less than 50% of them are known (even this limited knowledge is available as individual pesticides, based on data provided by manufacturers).

Indian pesticide production reaches upto 90,000 metric tonnes annually; production is the largest in Asia and ranks twelfth in the world. The Indian pesticide industry has a turnover of more than 20 billion rupees, and its average growth rate is 2 to 5% annually.

The agricultural sector consumes around 67% of the pesticides produced; within the agricultural sector, two thirds of the consumption is taken up by just a few crops like cotton, paddy, vegetables and fruits. Apart from some five to six large multinational companies, there are around 30-40 large technical grade manufacturers. The multinational companies include Syngenta, Bayer CropScience, DuPont, Monsanto and DeNocil. Prominent names amongst the Indian players are Rallis (Tata group), United Phosphorus Limited, Searle, Excel Industries, Gharda, Lupin, Aimco Pesticides Ltd, Dhanuka Pesticides, Hindustan Insecticides Limited etc. There are also more than 500 formulators who buy technical grade pesticides from the manufacturers to be processed into formulations.

India is a generic pesticide market usually (production and use of old molecules which have gone off-patent continues here). Unlike countries like Sweden which have policies related to de-registration of molecules after a particular period, India continues to use pesticides created in the 1950s and 1960s also, which have been subsequently banned in many other countries, including developing countries like Srilanka, Syria, Indonesia, Thailand and some African countries.

Highest consumed pesticides in India include Monocrotophos, Endosulfan, Phorate, Chlorpyrifos, Methyl Parathion, Quinalphos, Mancozeb, Paraquat, Butachlor, Isoproturon and Phosphamidon. In volume terms, Organochlorine pesticides constitute 40% of pesticide use, followed by Organophosphates at 30%, Carbamates at 15%, Synthetic Pyrethroids at

¹ Source: Directorate of Plant Protection and Quarantine, Faridabad

10% and Others at 5%. In value terms, Organophosphates dominate at 50%, followed by Synthetic Pyrethroids at 19%, followed by Organochlorines at 16%, Carbamates at 4%, Biopesticides at 1% and so on.

The pesticide consumption varies vastly across different states, depending on several factors, including cropping patterns, irrigation facilities, pest resurgence and resistance situations and so on. The following table gives an idea about the quantities of pesticides consumed by various states in India.

Major Pesticide Consuming States (in tonnes)	
States	Quantity
Andhra Pradesh	13000
Uttar Pradesh	11000
Tamil Nadu	9500
Maharashtra	6900
Punjab	6400
West Bengal	5800
Haryana	5200
Gujarat	5100
Karnataka	4400
Rajasthan	2900

Source : Agricultural Research Data Book, 2001.

The crop-wise consumption of pesticides in India presents the following picture:

Crop	Pesticide Share - %	Cropped Area - %
Cotton	52-59	5
Rice/Paddy	17-18	24
Vegetables and Fruits	13-14	3
Plantation Crops	7-8	3
Cereals/Oilseeds/Pulses	6-7	58
Sugarcane	2-3	2

Source: IARI data, 1999

The above table points out the intensity of pesticide use in cotton in India. Even in terms of value, cotton consumes the highest amount of pesticides: 44.5% of the total cost spent on pesticide consumption, equivalent to 2462.13 million rupees. Cotton is also supposed to consume 58% of insecticides in India, while consuming the highest share of pesticides.

Annexure 2: Pesticides in Andhra Pradesh

Andhra Pradesh is one of the leading states in India when it comes to pesticide consumption. The consumption varies slightly from year to year and quite dramatically across different districts. The following is a picture of district-wise consumption of pesticides in the state.

District Wise Consumption of Pesticides, in MT, Technical Grade (from 1994-95 to 2002-03)

SL No	District	Consumption
1	Srikakulam	338
2	Vizianagaram	629
3	Visakhapatnam	542
4	East Godavari	2588
5	West Godavari	3636
6	Krishna	2908
7	Guntur	12400
8	Prakasam	2908
9	Nellore	2276
10	Kurnool	3874
11	Anantapur	1155
12	Cuddapah	975
13	Chittoor	1606
14	Rangareddy	2119
15	Nizamabad	2046
16	Medak	707
17	Mahbubnagar	1590
18	Nalgonda	2104
19	Warangal	4382
20	Khammam	3675
21	Karimnagar	2349
22	Adilabad	1425

Compiled from information

provided by Commissionerate of Agri., AP

Guntur district has the dubious distinction of being the largest pesticide consuming district in the whole country. The farmers from here have moved into other districts in search of good soils and other resources once their own lands started becoming unproductive due to intensive agriculture. West Godavari was in the heart of the Green Revolution efforts and the pesticide consumption of this district reflects this fact. Districts like Warangal, Khammam and Kurnool which have moved into cotton cultivation have inherited the toxic baggage that the crop is supposed to carry with it - pesticide consumption in these districts has also been on the rise for some years now.

The increase in pesticide consumption is closely linked to its increasing inefficacy and the result of this abuse is pest resurgence and resistance. Farmers have to resort to using more and more number of pesticides, as well as more powerful pesticides. All of this is reflected in the upward spiral of cost of cultivation.

Andhra Pradesh is now known for its farmer-suicides not just in India but abroad. Starting from 1997, thousands of farmers have committed suicides in this state. This extreme sign of distress has still not abated by 2004. In just four months between May and August 2004, more than 1200 farmers have committed suicides in this state. The government is still not paying heed to the root causes of the problem.

Many analyses of the suicide phenomenon have linked pesticides and the resultant spiralling costs of cultivation to the suicides, amongst other reasons. NIOH's [National Institute of Occupational Health] senior officials have even admitted to the possibility of pesticides creating suicidal tendencies amongst farmers because of adverse neurological impacts such as depression though no study has been attempted in this regard². Some civil society reports have pointed out various health effects that pesticides were causing on various communities. For instance, a Fact Finding Report called "The Killing Fields of Warangal" brought out in 2002 estimated that nearly 500 sprayers might be getting killed or hospitalised each season in just one district of Andhra Pradesh - Warangal, due their exposure to toxic pesticides as an occupational hazard. Media reports from various districts constantly talk about even little children being affected by pesticides in cotton fields. Seed cotton production in the state of Andhra Pradesh is also supposed to be causing a lot of health effects on the child labourers being employed in this enterprise³. "Arrested Development", a report by Greenpeace India found that pesticides were impairing developmental abilities of children in districts like Warangal. A study was taken up to look at the reproductive effects of pesticides on sprayers in cotton fields⁴. Data on reproductive toxicity were collected from 1,106 couples when the males were associated with the spraying of pesticides (OC, OP and carbamates) in cotton fields. Data were also collected from 1,020 unexposed couples matched for age and socio-economic status. Analysis of the reproductive performance gave the following incidence rates for the former and latter groups respectively; abortion 26 % vs 15 %, still births 8.7 % vs 2.6 %, neonatal deaths 9.2 % vs 2.2 %, and congenital defects 3 % vs 0.1 %.

The ecological implications of the pesticide abuse are well known to farmers as well as the industry and agriculture scientists. Crop pest resurgence problems in crops like cotton and paddy are well documented⁵. A large number of polyphagous pests such as jassid, whitefly, pink, spotted and spiny bollworms are reported to have attained a serious status. The farmers were found to follow several unusual agronomic practices and uncommon combinations of pesticides to overcome the problem of insect pests. Defective pesticide

² NIOH Director's presentation in CHESS, Bangalore, 2002

³ Davuluri Venkateswarlu: Child Labour and Transnational seed companies in Hybrid Cotton Seed production in Andhra Pradesh, 2002

⁴ Rupa, D.S., Reddy, P.P. and Reddy, O.S. Reproductive performance in population exposed to pesticides in cotton fields in India. *Environ Res* 55: 123, 1991.

⁵ Ecological Implications of Pesticide Use in Agro-ecosystems in India: P K Shetty, NIAS, Bangalore, 2001

spraying, sub-lethal or over dosages coupled with spraying of spurious insecticides, have also aggravated the problems of pests in the hot spots. The continuous use of pesticides in the hot spots resulted in the decline of natural enemies of insect pests, which is one of the main reasons for resurgence. Overuse of pesticides has brought about a decline in the biodiversity of non-target organisms in the hot spots, it is reported.

