

Case Study of Herbal Pesticide

Formulated by Mr Chellamuthu

Mr. Chellamuthu (58) is an agricultural laborer living in Karukkampalayam village, Erode District, Tamil Nadu. He studied up to 7th standard . He is an agricultural laborer . He has been engaged him self in spraying of chemical pesticides since 1990 and he often suffered health problem due to frequent exposure of pesticide . In order to overcome pesticide hazard he strived hard in developing herbal pesticide and by trial and error he standardized it over a decade of his continuous experimentation with different crop pests . The story of developing the pesticide is highlighted here.

Genesis of Innovation

Chellamuthu an agricultural labourer engaged himself in various agricultural operations in his area known for irrigated garden land with crops like sugarcane, turmeric, paddy and vegetables. During May 1997 he has been engaged in spraying activity in his village by using a power operated sprayer for control of sucking pests in turmeric crop (thrips developed resistance in turmeric and unable to control if a single pesticide is sprayed) and he mixed two strong pesticides i.e. Monocrotophos and Endosulfan together and sprayed to crop . He immediately developed giddiness, headache and vomiting and admitted to a private hospital . This hospital is run by Dr Natarjan in Kodumudi town. After the medical treatment he has been convinced not to take up chemical spraying any more . With the help of physician Natarajan who treated him suggested switching over to natural alternative by using plant ingredients as pesticide formula. He has gathered idea of some herbal plants with pesticidal values viz. *Nochi*, *Peenarichangu*, Aloe vera .He added on his own commonly available neem in the preparation . Within a month of experimentation Mr.Chellamuthu developed crude formulation of herbal pesticide i.e. during June 1997 . Initially he was using the following ingredients with equal quantity for preparing herbal pesticide :

Initial Composition of Herbal Pesticide Formulation

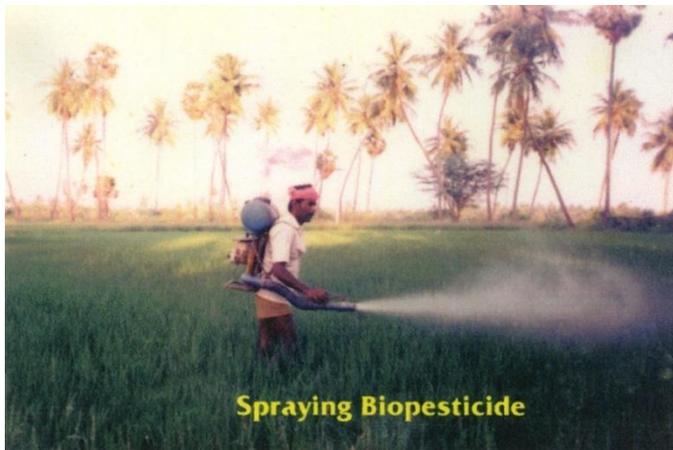
Name of plant species	Scientific name of plant	Quantity in Kg
<i>Leaves of Nochi</i>	<i>Vitex negundo</i>	2
<i>Leaves of Peenarichangu</i>	<i>Clerodendrum inerme</i>	2
<i>Leaf sheath of Sotrukatralai</i>	<i>Aloe vera</i>	2
<i>Leaves of Vembu</i>	<i>Azadirachta indica</i>	2



Later he replaced neem leaves with neem seeds as the extract do not obstruct pores in leaves he says . When this formula was used he observed good vegetative growth of the plants treated with the pesticide . To his surprise after a fortnight the plants developed discoloration and yellowing . In order to overcome this situation he added other ingredients such as *Pungam* , *Tulsi* , *Datura* , *Adathoda* without any success . While adding *Calotrophis* the plants remain evergreen in colour and he continued adding *calotrophis* as additional ingredient.. His experimentation continues between 1997 and 2000 and whatever he earns by his agricultural wages he spent in his leased land of 2 acres for his own experimentation with different crops . Finally he was able to standardize .



Story of First Testing of herbal Pesticide



Initially he was approaching many farmers for treating their field with herbal pesticide ; nobody was interested but continued their existing schedule of treating with chemical pesticide . One day evening he himself went to a farmers field (being his uncle Mr Balasubranian) and found that turmeric was 4 months old crop with symptoms of sucking pests . Without intimating the farmer(his uncle) he sprayed his herbal pesticide for turmeric crop in a separate plot of 30 cents . He used 10 tanks of sprayer (100 litres of pesticide solution) at 5% concentration i.e. 500 ml in 10 litres of water. After few days the treated crop shows good growth and the owner of the field surprised by seeing the treated plot . During that time Mr.Chellamuthu has revealed the truth that he has under taken spraying with herbal pesticide without his knowledge

and asked for excuse . However the farmer has convinced the need for spraying herbal pesticide in the remaining cropped area due to good results observed by him. He has given order for spraying extra area of 3 acres by using herbal pesticide . Now Chellamuthu has got first spraying order from this farmer during June 1997 and with this task he received orders from other farmers steadily and gradually .Within few months he completed spraying in turmeric in about 150 acres. Mr Gunasekaran ,a farmer in his village gave order for spray for control of paddy leaf roller pest in a plot of 40 cents. By seeing satisfactory outcome in paddy pest control he sprayed his herbal pesticide against brinjal fruit borer in Kolathupalayam village where a farmer Mr Chinnasamy has raised brinjal in about 80 cents of his field . Dr.Nataraj local physician is also well known respected person in in that area heard success stories from Chellamuthu and spread this message by organizing farmers meetings in few villages. During August 1997 local honey bee network coordinator Mr.Vivekanandan met Chellamuthu in one of the village meetings organized by Natarajan and later his innovation has been published in Tamil version of honey bee i.e.*Numvalivelanmai* . Later near by villagers came to know about herbal pesticide and they contacted Chellamuthu and procured herbal pesticide on cost basis .

Incidence of Eriophyid Mite in Coconut

Initially he was targeting crops such as turmeric , sugarcane , paddy and banana. During 2001 there was an outbreak of disease in coconut trees caused by Eriophyid mite . The affected trees yield under sized nuts and the sale price of nuts reduced by Rs 1 per nut and it contributes substantial loss to coconut farmers.The tree also shows stunted growth . Farmers were trying with root zone application of Monocrotophos solution in a plastic container /pocket without much success. He developed a formula for control of Eriophyid mite in coconut . The ingredients used for the preparation of pesticide for mite control include additional 2 herbs such as leaves of Custard apple (*Annaona squamosa*) and turmeric rhizome in the existing formula prepared earlier. Because of severity of pest which developed resistance to existing chemicals he included custard apple based on local knowledge as it is used against lice control . For details of preparation please refer Annexure-1.

There was also an innovator Mr Rajendran in Erode district who developed a biological predator (predatory mite) for control of mite in coconut. In 2002 a farmer in Muthur village Mr Muthusamy invited both the innovators to try out which treatment provides better control of mites. Chellamuthu treated 50 coconut trees by using herbal pesticide and he poured 3 litres of pesticide solution (300 ml pesticide diluted in 3 litres of water) in the crown region; Mr Rajendran released predatory mites in another 50 trees. After 6 months herbal treated trees show less infestation. This farmer has been procuring herbal pesticide from Chellamuthu for another 2 years continuously and in turn sold to other farmers too.

Mr Chellamuthu so far treated about 10,000 coconut trees against mites. When coconut trees are treated with herbal pesticide he observed increase in weight of nuts at 10-15 kg more weight for each bag of nuts. It also controls Rhinoceros beetle in the crown region. Besides when the seedlings are younger it prevents damage of termites. The details of preparation of herbal pesticide specific to coconut and method of application is shown in Annexure.

Treatment of Mealy bugs in Sugarcane



There was infestation of mealy bug outbreak in sugarcane in that area during 2005. With existing formula of herbal pesticide he was unable to control mealy bug infestation in sugarcane. This is locally called as *panchasunyam* as white color soft covering of leaves is noticed with the incidence of mealy bug in sugarcane. He realized the need for including pungent substances such as ginger, garlic and green chillies based on innovation published in Numvali velanmai –local version of honey bee (2001). Later he added black pepper, tobacco leaves and neem oil. For preparing the herbal formula the following ingredients are needed: Garlic – 1 kg, Ginger- 500 gm, Green chillies - 500gm, Pepper – 200gm, Tobacco 500gm, Neem oil 200ml, Khadi soap 30gm.

First garlic has to be soaked 100 ml of kerosene for over night and this has to be ground along with green chilies and pepper. Then tobacco is to be soaked in water for one day and then filtered and has to be mixed in with 200 ml of Neem oil. Now all of them are to be mixed together. Finally, soap 30 gm, has to be added and stirred well. Now the total quantity of the mixture will be about 7 litres. This entire quantity will be sufficient to spray 1 acre. (Add 700 ml of the fluid in 10 litres of water and sprayed; totally 10 tanks are to be sprayed; tank capacity is 10 litres). After spraying this herbal pesticide the leaves turn in to dark green and the colour is retained for ever. He has so far tried this practice for 6 farmers who cultivate Turmeric and farmers gave good feed back. He sells this pesticide at the rate of Rs 50 per litre, After seeing this success he tried the same method for control of sugarcane early shoot borer, mealy bugs and paddy earhead bug which are also equally damaging pest . He found satisfactory results.

By seeing the successful control of mealy bug the local sugarcane mill authorities (Pugalur Mill) approached Chellamuthu to reveal his formula . He told the ingredients without mentioning proportion of mixing . This also enhanced his familiarity and his sale of pesticide increased (500 farmers used the pesticide during 2002-2003) . This is the time his wife and children joined this venture in helping him in procuring herbal ingredients and also grinding in the motorized grinder .He has covered 100 acres of sugarcane for control of mealy bugs.

Control of *Semporian* Disease in Turmeric

In turmeric he noticed “*semporian* disease” caused by fungus . Initially circular shaped yellowing takes place and it will enlarge to the whole surface of leaves and it will become burnt like appearance. After some time the plant will die. This disease will occur during the month of karthigai & Margali (winter months-Nov - Dec) usually 150 days after planting of turmeric. Nowadays due to application of chemical inputs the disease is noticed much earlier i.e. 80 – 90 days after planting. Farmers normally adopt chemical method of control by spraying chemical pesticide like Bevistin, Dithane M45 and spent up to Rs 600 to & 700 for 1 acre. For control of this disease Tamil Nadu Agriculture University, Coimbatore recommends spraying of Indofil or Dithane M 45 once in 20 days keep on adopting this chemical method to prevent this disease as told by the farmer. Therefore once this disease comes farmer has to spend lot of money to save the crop. . This disease either appear alone or sometimes coupled with root rot disease caused by nematodes during rainy season (Oct- Nov) . He tried the above formula used for mealy bugs without much success . Then he applied asafetida in the root

zone of the turmeric simultaneously . It induced more number of lateral roots and also able to control the growth of nematode

He is applying asafotida in gunny bag @2 kg per acre (twice at 1 kilo each) and places it in irrigation channel so that it gets diluted and carry the smell or chemical content of the substance to the crop and got absorbed through roots . He followed application of asafetida whenever there is incidence of root rot in groundnut ,gingelly, jasmine . Usually symptoms of affected plants is visible on 30-40 days after sowing and immediately it should be treated with asafoetida.

This practice has spread from farmers to farmers dissemination mode ;initially 25 farmers followed this method and now about 500 farmers have adopted this practice .Some details gathered about the spread of this practice in Erode and Karur District is shown here :

year	Name of Villages spread in Erode and Karur District	Number of users
2003	Modakkurichi	25
2004	Arachanur, Karukkampalyam	125
2005	Nadayanur,Velayuthapalyam	230
2006	Avinasi	350
2007	Paramathi	500

Other than turmeric placing asafoetida were tried for other crops viz.

Kanvalikilangu (*Gloriosa superba*) , *Nelli* (*Phyllanthus emblica*) . In horticultural crops shedding of flower buds controlled; in *Kanvalikilangu* (*Gloriosa superba*) leaf eating caterpillars are controlled .

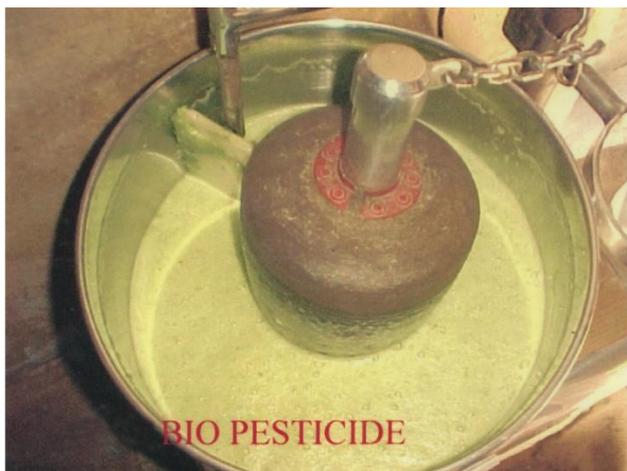
Menace of Parrots

He also learned preparation of Panchagavya which is popular among many organic farmers in Tamil Nadu. It is prepared by using cow products . He also started selling Panchagavya along withy herbal pesticide . He developed a package of practices for different crops by using herbal pesticide and organic liquid fertilizer together or separately and alternatively sprayed at 15 days interval.

Dosage he advocates 300 ml of herbal pesticide solution in 10 litres of water i.e 3% for all crops he suggest spraying of pesticide has to be alternated with spraying of panchagavya . i.e first round herbal pesticide , second round panchagavya , third round herbal pesticide , fourth round panchagavyacontinued like this . Sometimes he mixes both herbal pesticide + Panchagavya in the final round or so . His method of preparation of panchagavya is given in Annexure -6 . We are also showing cropwise schedule of treatment and interval etc in Annexure 5.

During 2007 once he observed that the treated plots (sprayed with Panchagavya) do not prone to attack of birds at least for a week in crops like maize, sun flower where parrots are causing sever damage to the flower head / kernals i.e. on 50 days of sowing in maize, 30 days after sowing in sunflower . He also observed that the effect of smell ill deter birds for a week and we have to repeat spraying at weekly intervals I.e. in case of maize it should be between 50-75 dyas with 3 sprays and for sunflower between 30-40 days of sowing and 2 sprays recommended. This method of preventing damage caused by birds has also been adopted by more than 200 farmers in Arachalur ,Vilakkethi, Modakurichi villages . This treatment incidentally increased the weight of kernels i.e. 15 kilo more weight in each bag of produce harvested

Method of Preparation and Storage ability



While treating with herbal pesticide he was grinding all the plant ingredients thoroughly . However this method was blocking the pores in the leaves and developed chlorosis like symptoms ; now he grinds nicely only Aloe vera and neem kernels and for other plant ingredients he pounds them for few minutes or partial grinding and extract is obtained after soaking for over night and filtered . This practice was also endorsed by Dr Regupathy ,Professor of Pesticide Testing Laboratory of Tamil Nadu Agricultural University (TNAU) ,Coimbatore .TNAU has evaluated the effectiveness of his product in collaboration with SEVA (collaborator -Honey bee Network) during 2004. Refer Annexure on test report.

Initially he was using the following ingredients with equal quantity for preparing herbal pesticide :Aloe vera , neem leaves , pinari sangu , nocchi . For 1 acre he used 2 kilo each of the ingredients. First for grinding them he used manual grinder and shifted to *chekku* (motorized grinder /power Ghani) . He has to travel few kilometer to use the *chekku* . It also needs two laborers in Chekku for pressing the ingredients intact . Therefore he used wet grinder available in his house . His wife was against using the grinder as it will create bad smell when we use it for kitchen purpose . However when he included Calotrophis as additional ingredient he stopped using the grinder for kitchen but dedicated another one for this purpose of preparing herbal pesticide . Later he replaced neem leaves with neem seeds as the extract do not obstruct pores in leaves he says . When this formula was used he observed good vegetative growth of the plants treated with the pesticide . To his surprise after a fortnight the plants developed discoloration and yellowing . In order to overcome this situation he added other ingredients such as Pungam , Tulsi , Datura , Adathoda without any success . While adding Calotrophis the plants remain evergreen in colour and he continued adding calotrophis as additional ingredient.. Including calotrophis was suggested by scientists who visited his unit during 1998.

The herbal pesticide can be stored for a longer period i.e. upto 1 year . He disposes all prepared pesticide within 6 months of preparation date . He observed that after 4 months the colour of pesticide changes into black without losing its effectiveness. But the volume of material loss by 20 percent by 5th month and also more loss once the duration increases. During transport he carry the pesticide in plastic container /canes after tight closing ; this will lead to development of gas inside leading to burst on some occasion; therefore it should be opened then and there to release the gas . On the advice of SEVA now he adds Potassium bisulfite ½ table spoon pinch in 20 lit container . Now it arrests fermentation without affecting the quality.

From Labourer to Entrepreneur

In the initial years of using herbal pesticide there were only few farmers who know about this. During 2000 he received SRISTI Sanman award for his work in herbal pesticide . After this news, agricultural officer (Mr Krishnamoorthi) in Canara Bank of Arachalur Branch wanted to test his pesticide in his 1 acre plot raised with tapioca . As it was effective he invited him for farmers meeting as resource person for organic farming in 6 villages where bank was servicing viz. Narikkattuvalasu, Chellathampalayam, K.G.Valasu, Lingathakuttai ,Arachalur, Vadugapatti ,Kumarapalayam . Then all the customers of bank approached Chellamuthu for any pest and disease problem in their crops and few ordered for herbal pesticide .By seeing the effectiveness of herbal pesticide once few farmers who have already procured Rogor and other chemical pesticide (for control of pests in onion) returned their products back to pesticide selling agents . This has created annoyance of local dealers and they gave threat call to Chellamuthu as he could not sell herbal pesticide as he does not have official license for selling . However due to support of local farmers and also news of conferring NIF Award by President of India and after publication of his picture with President of India and his innovation in local Newspapers during 2002 gave good credit to his venture and there by threat from company dealers did not make sense. He also told the ingredients of pesticide and few farmers started preparing the solution on their own ; some well to do farmers engaged labourers to procure the herbal ingredients and tried preparing it but for them it was costlier than purchasing from Chellamuthu and therefore they gave up preparing it on their own. There is a good demand for his herbal pesticide for turmeric and paddy in the following villages : Velampalayam , Kaniyampalayam , Mutthur , Somur, Palliyuthuin in Erode district . For crops like banana and sugarcane the farmers of the following villages regularly procure herbal pesticide from him: Noyyal , Maravapalayam , Avadayar pallayam , Nadayanur.

Regularly about 200 farmers still depend upon him for procuring his pesticide . Please refer table about village / area wise number of farmers and crops for which it is used. Some of the regular customers are : Kannambal , Narikattuvalasu - 9942190484 , Puravi muthu , Muthoor -9965929098 , Nalla sivam , Aruvathu Velampalyam -9715117769, Nandhu , Poiyarikattoor -9787189689, V.Thiyagarajan , Andaman Island -09434281145 , Ravi

, Nayakkanoor, Pattavaithalai-994385559. He is able to meet the demand and supply them in Tamil Nadu not attempted in other states .

For orchard crops such as guava , sapota , pomegranate , grapes farmers in Andaman island procure his herbal pesticide at 100 litres per month through a local agent at Chennai . This is after publication of an article about his pesticide in Farmers Column of “ The Hindu” on 26 Feb2009. Very recently a gentleman from France came here to procure his sample for future bulk export but it may take long way to go to fulfill many official formalities needed.

He sells about 5000 -liters of herbal pesticide in a year with peak season during August - Dec. He sells now about Rs 80 per liter. Mostly farmers are using herbal pesticide for turmeric and paddy .

Conclusion

The herbal pesticide developed by Mr. Chellamuthu during 1997 is based on locally available ingredients and he prepared 3 different formulations to meet out different pest problem noticed in different crops. This has positive effect on crop yield, quality of produce and it was also officially confirmed for its effectiveness when it was tested by Tamil Nadu Agriculture University, Coimbatore during 2004 . This herbal pesticide is also a remedial one when a farmer (Marimuthu ,Noyyal village) who almost lost banana plantation due to weedicide toxicity and able to recover his plants when the herbal pesticide is sprayed twice followed spraying of one round of panchagavya. For human beings or person involved in spraying operations (by using herbal pesticide) are relieved from fever,indigestion etc. Therefore it is ecofriendly and improve the health of both plant and animal system .

Awards for Chellamuthu

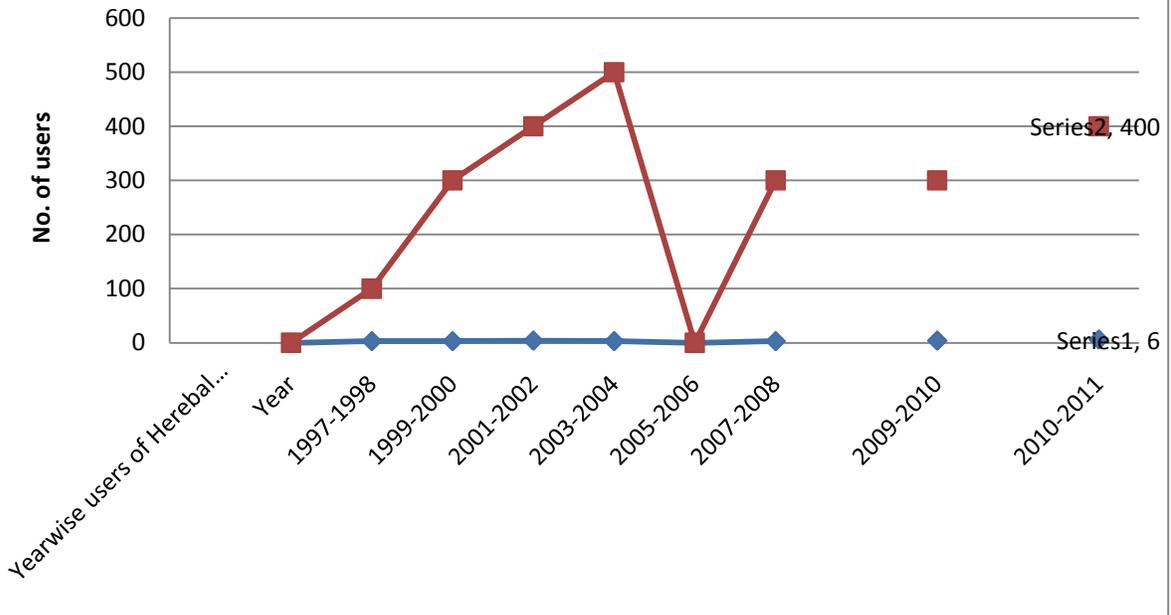


The entire process of development of herbal pesticide associate with his livelihood, survival, and curiosity or motivation in finding alternate solutions to tackle pest specific to crop and pests. Now his sole livelihood is primarily selling of herbal pesticide and with his income also enabled in repairing his house into pucca one and educating his 2 daughters to complete high school education. Venture capital support by NIF (Rs 20,000 during 2000) and SEVA (Rs 10,000 during 2007) also helped him to overcome financial difficulties faced by him when he himself experimenting different formulations in his leased land. He received award from SRISTI, Ahmadabad (SRISTI for Sanman award) during 1999 and cash award and citation from President of India in the award ceremony of National Innovation Foundation during 2000. He has been recognized by Environment Award during 2004 by Tamil Nadu State Government (by Department of Environment, Chennai). He has been invited by Green Foundation in Karnataka for dissemination of herbal pesticide among farming community and this also became more popular in Karnataka too. During this course of development he has standardized method of preparation, dosage, schedule of treatment for different crops or season.

After undergoing 23 years of rigorous pursuance of spraying operations by using his own product he feels now who will take it forward to meet the demands of farmers locally in future.

Now he worries as so far no youth to be come a successor when he become aged. Hope his feelings will be fulfilled when an youth takes this task.

Yearwise users of Herebal pesticide in different villages in Erode, Karur, Tirupur district



Annexure -1

Story behind “ Herbal Pesticide “ by Chellamuthu

Mr. Chellamuthu (58) is an agricultural laborer living in Karukkampalayam village, Erode District, Tamil Nadu. He has been involved in spraying of chemical pesticides and he suffered due to frequent exposure of pesticide exposure and realized his mistake. With the help of Kodumudi Natarajan he developed skills in preparing herbal pesticide.

Ingredients for Herbal Pesticide

Nochi (*Vitex negunda*), Peenari changu (*Clerodendrum inerme*), Chothukathalai (*Aloe vera*), Neem seeds each one kilo. All are to be grinded well by adding little water and then diluted in 100 liters of water for spraying one acre. (However he has standardised the preparation by adding correct dose of ingredients as indicated above. He is putting 1/2 litre herbal mixture in 1 spray tank and fill up with water.) He wanted to test this spray mixture and told some farmers. No farmer was interested to try this formula. However he went to his uncles field along with the sprayer and herbal pesticide and sprayed it to turmeric in 30cents without telling to his uncle. He sprayed in the late evening time and nobody noticed his spraying operation. After 3 days his uncle has informed that his turmeric crop is very good. Then Mr. Chellamuthu explained that he has actually sprayed herbal pesticide to that crop. His uncle has given order for spraying this herbal pesticide in another 3 acres field. Later on many farmers come forward to accept this herbal pesticide.

For paddy he used to spray only one time i.e. 25 -30 days after planting. It takes care of all sorts of pest and disease problem. He is charging Rs.20 per spray tank. (For spraying one tank he charges Rs.12 for the cost of herbal pesticide preparation and Rs.8 for rent for spraying operation). The demand for herbal pesticide has been growing in 10-20 villages and in order to meet their demand he has purchased a wet grinder (power operated) and used it exclusively for grinding herbal ingredients. Now the capacity of the wet grinder is not sufficient. Therefore he is approaching nearby village and utilizing the rotary extractor / machine for grinding his herbal ingredients. He is paying Rs.50 per hour for grinding this herbal ingredients in the rotary machine. After grinding he is keeping the herbal mixture for over night and then go for spraying. He is using this mixture by keeping it upto one month from the date of preparation.

He is taking this herbal mixture through plastic cane by using two-wheeler (TVS 50). He is also telling the farmers how to prepare this herbal pesticide. But no

farmer is interested in preparing the herbal pesticide on their own and they depend upon Chellamuthu for spraying this herbal pesticide.

In addition Chellamuthu has been engaged in preparing Panchagavya and spraying it to crops. Preparation of Panchagavya has also been suggested by Dr. Natarajan. Now Chellamuthu has standardised the preparation techniques of Panchagavya. Farmers depend upon him for growing their crops organically by utilising the service of Mr.Chellamuthu for spraying panchagavya and herbal pesticide. Fifteen farmers started preparing Panchagavya after seeing the good result established by Chellamuthu. However for spraying Herbal pesticide they depend upon Mr.Chellamuthu.

Herbal formula for control of Eriophyid mite

He developed a new formula for control of coconut, Eriophyid mite. The Eriophyid mite is prevalent in most Coconut growing regions of South India. This pest has spread from Kerala to Tamil Nadu through Pollachi. Due to the incidence of the mite, the nuts get shrink and become small in size which affect its marketability. Further on the husk minute cracks and dryness is found which make the husking operation difficult. Consequently great loss is incurred by the Coconut growers.

To solve this problem Mr.K.Chellamuthu has developed a herbal formulation for preventing this mite in a natural way. He has also tested successfully in few farmers garden (2000 trees) in his village. His treatment method is given below :

Required plant products :

Leaves of Custard apple (*Annona squamosa*) - 1 kg

Turmeric rhizome - 1 kg

Peenari changu (*Clerodendrum inerme*) - 1 kg.

Chothukatralai (*Aloe vera*) - 1 kg.

Nochi (*Vitex negundo*) - 1 kg

Neem Kernel (*Azadirachta indica*) - 1 kg

Calotropis - 1 kg.

The above products are ground into a paste by adding sufficient water and about 5 liters of juice is extracted. This is diluted with another 15 liters of water to make into 20 liters finally. This herbal extract is administered into the crown region at the rate of 2 liters per palm after the harvest of nuts. This can be repeated once in two months i.e. during the every harvesting time. He collects Rs.10/- per coconut tree for applying this treatment. He has 2 daughters (13 years and 9 years) and wife. All are involved in preparing both herbal pesticide as well as Panchagavya. His daughters though they are studying will help in the preparation during leisure time. However his wife is fully engaged in collection of herbal ingredients and preparation. Now they are staying in a rental house. This house is coming for sales. He is looking for his fortune for leasing out this house on long term basis which is crucial for preparing large scale production of herbal pesticide. He is covering about 100-150 acres per month during peak season (Oct.-Dec.) Now he improved his health after spraying with herbal pesticide for the past one and half year. He gets good digestion and appetite which seems to be good indication of herb induced health he is acquiring. The paddy grains produced through spraying with herbal pesticide is very hard and more weight. The quality of the food is also improving says Mr. Chellamuthu .

Standardization of Herbal Pesticide

Initially he come across chlorosis (yellowing of foliage) immediately 3-4 days after spraying herbal pesticide in turmeric and other crops. Later on he got the idea of including calotropis leaves in the herbal mixture as one of the ingredients. He got this idea by observing the coconut tree by seeing the colour of the dark greenish nuts after spraying for the purpose of controlling Eriophyid mite. Then he included calotropis for preparing herbal pesticide even for other crops. (calotropis is known for containing boron element). Nowadays the crops sprayed with herbal pesticide is greenish in colour and do not developing yellowing.

Popularity of Chellamuthu's Herbal formula

Initially there was a problem in convincing the farmers. Nowadays everybody is aware of his herbal pesticide almost in Erode and Karur Districts. He gets full employment during Oct.-Dec. In the remaining months he gets employment 15-20 days in a month. Now he is selling Panchagavya also. He is also treating coconut trees against Eriophyid Mite and fruit trees ,vegetables .

So far he has treated 2000 coconut trees with his herbal formula. He is earning Rs.500 per day during peak season. He charges Rs.20 per tank of spraying through

power sprayer. He has been regularly invited by some NGOs and farmers groups in the organic farming workshops / seminars which he is accepting and attending them promptly. He has been specially invited for attending inaugural function for launching National Innovation Foundation at New Delhi during Oct. 2000.

Annexure -2

Chronology of Events in the Development of Herbal Pesticide by Mr. Chellamuthu

Sl.No	Year	Events Occures
1.	Till 1996	He has been spraying chemical pesticide as an agricultural labourer
2.	May 1997	He developed sickness due to pesticide exposure
3.	June 1997	He received suggestions from Dr. Natarajan for switch over from chemical pesticide to herbal formulations
4.	June 1997	He first sprayed his herbal preparation in Turmeric
5.	July 1997	Local farmers also gave spraying order with herbal pesticide
6.	Aug. 1997	First Acquaintance with Honey bee Network
7.	1998	New ingredient viz. Calotrophis added based on suggestion of scientists
8.	1998	Many farmers in Karukkampalayam village returned back chemical pesticide to the dealers (Rogor, Dithane, Quinolphos, Monocrotophos) and switched over to herbal pesticide
9.	2000	SRISTI Sanman award conferred
10.	2000	Local Newspaper covered his herbal pesticide article ('Dinamalar' News)
11.	2001	New Formula evolved for control of coconut Eriyophyiid mite
12.	2002	NIF Award conferred at national level
13.	2004	Herbal pesticide was tested by Tamil Nadu Agricultural University
14	2004	Change in the method of preparation of pesticide –instead of grinding nicely light grinding and then extract of Juice followed except for neem .;this method do not block the pores in leaves and thereby crops escape blackening
14.	2005	Incidence of mealy bug as a major pest in sugarcane due to over dose of spray of chemicals

		viz. Acephate in combination with Monocrotophos in that area
15.	2006	New formula for herbal pesticide developed by Chellamuthu for control of mealy bug in sugarcane
16.	2008	Herbal pesticide tested for animal dewormer with Tamil Nadu Veterinary Animal Science University
17.	2009	'Farmers Note Book' column of "The Hindu" carried an article on his herbal pesticide
18.	2009	Dinamalar – Tamil Daily carried an article on his experience with herbal pesticide
19.	2010	Export order enquiry from abroad

Annexure 3

Regular Customers / purchasers for spraying

Herbal Pesticide in Erode District

SI.No.	Area/location / village	No.of Farmers	Type of crops for Treatment
1.	Sivagiri Block	60	Sugarcane, Turmeric, Gingelly
2.	Modakurichi Block	50	Paddy, Turmeric, Gingelly
3.	Noyyal, Block	50	Banana, Sugarcane, Turmeric
4.	Karukkampalayam Block	50	Turmeric, Onion
Total		210	

Annexure 4

Indicators of Judgement on Effectiveness of Herbal Pesticide

SI.No.	Indicators	Crop associated Specifically if any
1.	Greenish colour of plant or dark green colour	vegetables
2.	Long healthy pancile	paddy
3.	Increased size of bud / flower	jasmine
4.	Uniform size of pods due to less droppings of flowers	groundnut
5.	Increased number of fruits and weight of bunch	banana, turmeric
6.	Sweetness in fruits	mango
7.	Storage life span extended up to 1 year compared to 6 months in chemical treated	turmeric
8.	Increased length of cane due to lessening size of internode at 6 “level instead of 9”; Increased yield of 5-10 tonnes	Sugarcane
9	Health of labourer spraying herbal pesticide improved – free from fever, head ache, indigestion, Asthma, skin disease	Lbourers engaged in spraying operations

Annexure - 5

**Cropwise Schedule of Treatment Standardized by Chellamuthu
(Package of Practices for organic farming)**

Sl.No.	Name of Crop	Stage of Crop / Days after Sowing /Planting	Treatment
1.	Paddy	20 th day 30 th day 45 th day 60-75 th day	Herbal Pesticide spray with 4 lit / acre Panchgavya spray – 3 lit / acre Ginger + Garlic + Chilli spray – Herbal pesticide 2 lit + Panchgavya 2 lit
2.	Grandnut , Gingelly Sunflower, Onion	15 th day 25 th day 40 th day 50 th day	Herbal Pesticide 4 lit /ac Panchagavya 3 lit / ac Ginger + Garlic + Chilli spray Herbal Pesticide 2 lit + Panchagavya 2 lit
3.	Greengram, Blackgram, Redgram	15 th day 25 th day 40 th day	Herbal Pesticide spray 4 lit / ac Panchagavya 3 lit Ginger + Garlic + Chilli spray
4.	Turmeric, Banana Sugarcane, Tapiocca Grapes, Cashewnut	30 th day on wards on 15 days interval	Herbal Pesticide spray and Panchagavya to be sprayed alternately at 15 days interval
5.	For all floral plants viz. Jasmine, crossandra, Roja etc	20 th day onwards at 10 days interval	Herbal Pesticide, Ginger + Garlic + Chilli, Spray Panchagavya – order of Spray has to be repeated at 10 days intervals
6.	Cotton, Brinjal, Potato, Beetroot , Cauliflower , Bhendi, Cucumber, Field Beans, Cabbage	20 th day onwards at 10 days interval	Herbal Pesticide spray and Panchagavya to be sprayed alternately at 15 days interval
7.	Mango	Before flowering time (button size mango)	Panchagavya 3 lit spray
8.	Sapota, Amla, Guara	During flowering season till fruit maturation	Herbal Pesticide spray and Panchagavya to be sprayed alternately at 15 days interval
9.	Coconut	During the time of harvest at 60 days interval	Herbal pesticide 300 ml is diluted is 3 lit water and sprinkled on crown region

Annexure -6

Preparation of “Panchagavya” – Organic Liquid Fertilizer

Mr. Natarajan, a farmer in Kodumudi village, Erode District has been using Panchagavya as an organic liquid fertilizer for crops over the past 8 years. He utilizes 5 ingredients obtained from cow for preparation of Panchagavya. He has done extensive research with his Panchagavya on various crops, animals and even earthworms. His findings have been validated by leading research institutes in the country, and he was awarded the prestigious "SRISTI Sanman" by a leading developmental organization in Ahmedabad. "The present form of Panchagavya is a single organic input, which can act as a growth-promoter and immunity booster. It is essentially a product containing 4 kg gobar gas slurry, 1 kg fresh cow dung, 3 litres of cow urine, 2 litres of cow's milk, 2 litres of cow's curd, 1 kg cow's ghee, 3 litres of sugarcane juice, 12 ripe bananas, 3 litres of tender coconut water, and 2 litres of toddy (if available). This will make about 20 litres of Panchagavya. The concoction is stored in a wide-mouthed earthen pot or concrete tank in open. Sufficient shade should be provided, and the contents should be stirred twice a day, both in the morning and the evening. In seven days, the modified Panchagavya will be ready, and it can be diluted before use on plants and animals."

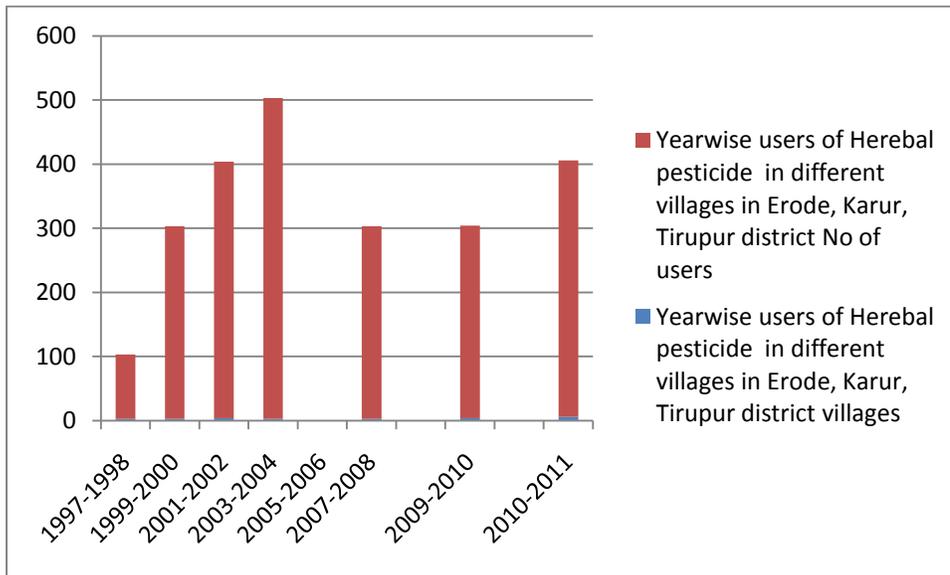
The cost of production of a litre of Panchagavya is around Rs. 35, and it can be brought down substantially if the farmers use their own cows' products. The Panchagavya is diluted to three per cent and sprayed on crops to get the best results. Three litres of Panchagavya is diluted with 100 litres of water and sprayed over crops to get rid of pests and diseases and also get higher yields. Seeds can be soaked and seedlings can be dipped in 3 per cent solution of Panchagavya for about 30 minutes before sowing to get good results from the crops. Later on some farmers have slightly modified Panchagavya preparation according to their convenience and experiences in organic farming.

Annexure - 7

**Yearwise users of herbal pesticides in
different villages in Erode, Karur, Tirupur Districts.**

S.NO	YEAR	VILLAGES	NO.OF USERS
1.	1997-1998	3 Villages in Erode district(Pudupalyam, Kuppampalyam, Rasampalyam)	100
2.	1999-2000	6 Villages in Erode district (Sivagiri, Vilakethi, Chempandampalyam)	300
3.	2001-2002	4 Villages in District (Muthur, Arachalur, Chennimalai, Nadaiyanur)	400
4.	2003-2004	3 Villages in Karur district Velayudapalyam, Thennilai, Noyyal.	500
5.	2005-2006	Drought season	Nil
6.	2007-2008	3 Villages in Erode district Arachalur, Ezhumathur, Mudakurichi	300
7.	2009-2010	4 Villages in Tirupur district	300
8.	2010-2011	6 Villages in Karur district Paramathi.	400
9	2011-2019	200 villages in Tamil nadu, Karnataka	1500

**Yearwise users of herbal pesticides in
different villages in Erode, Karur, Tirupur Districts.**



Year wise sales turnover and cost of Herbal pesticide

S.NO	Year	Quantity sold in Litre	Cost of Herbal pesticide Rs. per lit
1.	2000	6000	30
2.	2001	7000	30
3.	2002	5000	30
4.	2003	4000	30
5.	2004	5000	50
6.	2005-2006 Drought season	0	Nil
7.	2007-2011	3000	80
8.	2012-2019	40,000	150

Annexure – 8

Testing of Herbal Pesticide by Tamil Nadu Agricultural University, Coimbatore

During 2004 Herbal pesticide developed by Chellamuthu has been tested along with the one developed by another innovator Mr. Nagarajan.

The testing has been conducted based on experiments at Pesticide Testing Laboratory, Coimbatore and in farmers field in 2 locations for against crop pests of Brinjal and Rice. The herbal formulation developed by two farmers effectively reduced the field populations of paddy leaf folder *Cnaphalocrosis medinalis*, stem borer *Spodoptera litura*, rice brown plant hopper *Nilaparvata lugens*, leaf hopper *Amrasca biguttula biguttula* on rice and brinjal fruit borer *Leucinodes orbonalis* on brinjal to an extent of 58.9, 63.0, 69.2, 55.9 and 78.7 per cent, respectively .

The laboratory experiments revealed ovipositional deterrent action against adult moths of *C. medinalis* and *L. orbanalis* and feeding deterrency against the larval / nymphal stages of *C. medinalis* and *N. lugens*.

Application of herbal formulations did not have any deleterious effect on the natural enemies in rice and brinjal fields.

Period of Test : Feb-Aug 2004

Principal Investigator : Dr Regupathy ,Professor of Pesticide Testing
Laboratory ,
Tamil Nadu Agricultural University (TNAU) ,Coimbatore

Address :

Mr. K.M. Chellamuthu
Karukkampalayam,
Oonjalur Via,
Erode district - 638 152
Tamil Nadu.
Cell : 9486602389

Documented by :

P. Vivekanandan
SEVA.
E-mail : vivekseva@gmail.com

Acknowledgement :

We are thankful for the support received from SRISTI, Ahmadabad for documentation of the case study.