Volume 1 No. 2, August 2011
International Journal of Science and Technology

http://www.ejournalofsciences.org

Pesticide Application and its Adverse Impact on Health: Evidences from Kerala

C Tholkappian, S Rajendran
Department of Economics, Periyar University, Salem – 636 011

ABSTRACT

Indian agriculture has been under stress quite for long time. Decline in public investment, poor extension net work, lack of marketing facilities, erratic input supply and others have all collectively contributed for decline or stagnant in Indian agriculture. Increasing use of synthetic inputs and non-judicial use of natural resources including land and water have also added the problem only to become worse. Now, there has been consistent attempt to either reduce the chemical inputs or stop its use in agriculture for promoting sustainable agriculture system. The state-owned Plantation Corporation of Kerala (PCK) began dumping pesticides through aerial spraying each year in the 1970's cashew plantations spread over 2,200 hectares in six gram panchayats of Padre village in Kasargod district. The continuous application of pesticides contaminated the flora and fauna, the aquatic system underwent tremendous changes, and the local inhabitants suffer from several problems. Initially PCK sprayed endrin and later switched to endosulfan, an organochlorine pesticide, which is effective against a number of pests in cashew, cereals, oilseeds, vegetables, coffee and tea. This exposes people to diseases like skin problems, cancer and lung complications. The severity of the matter came to light only when a new Delhi-based NGO, the Centre for Science and Environment (CSE), tested blood samples from affected villagers. The centre has set up the Pesticide Environment Pollution Advisory Committee under the union department of agriculture. However, the Supreme Court has continued to observe public interest litigation on pesticides regarded as hazardous in developed countries being dumped in developing countries including India. Proper assessment, rigorous monitoring and environmental implications of synthetic chemicals should be ascertained will before allowing for large scale use. More significantly, the long term implications on the human health and environment need to be studied scientifically for sustainable development.

Keywords: *Vegetable, human blood, live frog, cashew, cow milk, endosulfan, an organochlorine*

I. INTRODUCTION

Across the world agriculture sector moving faster from food provider to poisoning the environment, which is a major threat to living organisms. Pesticide residues did not spare the precious 'mother's milk'. When Rachel Carson's *Silent Spring* was published in 1962, many did not believe her revelations on the effect of the dumping of chemicals. Decades later, her findings are similar to the happenings in the India's highly literate state of Kerala. Poor scientific research, ignorance, and a mindless administration dumping poisonous pesticides have all collectively caused irreparable damage to the environment, and generated only paltry economic gains. Developing countries are now becoming the dumping ground yards for pesticides that have been banned in developed countries. However, use of banned pesticides is common in Indian agriculture, which is claiming precious human lives.

Indian agriculture has been under stress quite for long time. Decline in public investment, poor extension net work, lack of marketing facilities, erratic input supply and others have all collectively contributed for decline or stagnant in Indian agriculture. Increasing use of synthetic inputs and non-judicial use of natural resources including land and water have also added the problem only to become worse. Now, there has been consistent attempt to either reduce the chemical inputs or stop its use in agriculture for promoting sustainable agriculture system.

During the early years of political independence the productivity of major crops in India was very low. The first five year plan gave more attention to medium and major irrigation projects to enhance the irrigated area for improving agriculture sector. This has yielded some what desirable results. Coupled with economic planning initiatives both the union and central governments have taken serious note of the frequent famines and started strengthening the agriculture sector. The cultivated area centered on nearly 60 million ha. and productivity was low during the early days of political independence.

The green revolution during mid 60's has enabled the country to expand the cultivable area to increase the crop production and productivity. Intensive District Agriculture Development Programme was introduced initially and expanded this to other areas where the resource endowments were storing. The results were: irrigated area increased; HYV seeds were introduced; chemical inputs were applied; intensity of land use increased; credit network has been extended and extension activities have been strengthened. All these were responsible for increasing the agriculture production and productivity at least in some pockets like Punjab, Haryana, Western Uttar Pradesh and some parts of south India. The desired results were being witnessed. At least the production and productivity of fine cereals have been increased significantly.

II. HIGHWAY MAP

Along side with the improving Indian agriculture better infrastructure had been laid in rural areas. This has facilitated to improve the performance of agriculture sector. Besides crop husbandry, every attempt has been made to improve the allied sector like animal husbandry, fisherises and forests. Thus, the all-round attempt has enabled to increase the farm productivity in India. This has been in peak till mid 80's. However, due to excessive land use, non judicial use of synthetic inputs and unscientific farm practices have all resulted in declining in yield level or stagnant in it. Many reasons including the low public sector investment and adverse impact of chemical on agriculture have been referred as main contributors for unsustainable agriculture. Immediately after the introduction of green revolution packages during six tees, crop production increased significantly thereby the impact of grains has been stopped. However, non-judicial input-factory made-use and unscientific methods of agricultural practices resulted in declining in farm production. Pesticide residues found in farm products including vegetables and fruits raised alarms bells not only to the policy makers but also to the farmers and environmentalists. The recent revelations on the application of banned pesticide endosulfan – on cashew plantations in Kerala are raising many worries.

III. CASE STUDY

The state-owned Plantation Corporation of Kerala (PCK) began dumping pesticides through aerial spraying each year in the 1970's cashew plantations spread over 2,200 hectares in six gram panchayats of Padre village in Kasargod district (Rajendran,2002). This was done during fleshing, flowering and fruiting seasons to combat pests. The continuous application of pesticides contaminated the flora and fauna, the aquatic system underwent tremendous changes, and the local inhabitants suffer from several problems. Initially PCK sprayed endrin and later switched to endosulfan, an organochlorine pesticide, which is effective against a number of pests in cashew, cereals, oilseeds, vegetables, coffee and tea. This exposes people to diseases like skin problems, cancer and lung complications. The severity of the matter came to light only when a new Delhi-based NGO, the Centre for Science and Environment (CSE), tested blood samples from affected villagers, and came out with its shocking findings (Table 1). One of the findings is that each resident of Padre whose blood was tested has endosulfan residues several hundred times the reside limit for water. The tests also revealed that human and cow milk is not spread either.

Table 1: Results on Endosulfan Residues in and around Padre Village

Sample	Detected value of Endosulfan	Maximum Residue Limit(MRT)	Number of Times Value Exceeds MRL	Site/Source of Sample
Water	9.19	0.18	51	The Kodenkiri stream near Vaninagar
Butter	14.00	NA		From the milk of cow of Saletadka
Cow's skin/fat tissue	49.99	0.1	500	From the abdominal region of cow from Padre
Cow's milk	57.20	0.5	114	From a stall-fed cow in Kumbdaje village
Vegetables	31.24	0.4-2.0	78-16	'Basale" leafy, spinach like vegetables from Kajampady
Human milk	22.40			Lalitha, 35, resident of Kumbdaje village
Human blood	196.47			Muthakka Shetty, 50
Live frog	10.35			From a stream in Kumbdaje
Cashew	3.74			From the plantation near Kajampady
Spices	212.28			Pepper bunch from Kajampady
Fish	22.24			From a tank in Kajampady
Soil	35.16	0.09	391	From Lalitha's house in Kumdaje

Cashew leaves	6.52			From the heart of Plantation at Periyal

Notes: 1 All figures in parts per million (PPM)
2 NA – MRL not available
Source: Down to Earth (2001)

Despite public awareness and high literacy levels in Karalla, no serious action was taken except in a piecemeal fashion and lip-service sympathy paid. Perhaps PCK thought that income generated from the cashew (including export) was more important than the environmental loss. Nonetheless, this is also proved to be a futile policy as cashew-importing western countries are disfavoring cashew kernels contaminated by chemical residues. There were reports that cashew to be shipped from Cochin port was rejected by the US as the kernel had pesticide residues above permissible limits. Realising this, the Mangalore Cashew Manufactures Association is in favour of stopping of aerial spraying of chemicals, due to the likely impact on the export market. Otherwise, the export of cashew Keralas will be severely affected.

Against this scenario, successful cases of controlling pests in various crops including cashew through eco-friendly plant based solutions instead of synthetic chemical pesticides have been reported (Rajendran 1998). Leaves of errukkan (*Calotropis gigantica*), marigold (*Chrysanthemum cinearaefolium*), pongamia (*Pongamia glabra*), tulsi (*Ocimum sanctum*) and neem (*Azadirachta indica*) have been used for preparing liquid solutions to control pests: However, this has been done on a trial and error basis, and hence state – supported research institutions ought to pay attention towards preparing eco-friendly pest repellents. These are reputed as not only economical but also environment friendly.

A few common pests like tea mosquito bug, shoot and blossom webber, apple and nut borer and flower and fruit thrips attract cashew trees during fleshing, flowering and fruit-setting stages. Pest-infected fleshes dry out and flowering is reduced, which leads to reducing the quantum of fruit-setting. All these cause losses to the cashew growers for which synthetic pesticides - mainly endosulfan - are being recommended. Besides, stem - and root borer attack the root and trunk system and this often lead to trunk brittle for which less harmful tar and lime is applied. Experienced farmers reveal that pruning of infected flowers will keep the pests at bay.

In fact, endosulfan is a commonly suggested pesticide since it is claimed to contain low poison levels. But often farmers use a high dosage of chemicals for speedy and immediate effect on the crops without following precautionary measures such as using a mask and gloves. Laboureres are thus affected by severe skin diseases besides suffering from nausea and vomiting. Mencher (1991) found that rice growers while applying poisonous pesticides don't adopt any precautionary measures. Though many farmers immediately do not feel an impact on their health, in the long run this does create health disorders. To provide health care facilties the governments need to spend huge amount of money.

Realizing the hazardous effects of endosulfan, Singapore, Denmark, the Netherlands, Sweden and Belize banned its use in 1999, and Korea and Bangladesh have disallowed its use on paddy fields. In fact, the US Environmental Protection Agency classifies endoslufan as a category lb (highly hazardous) chemical, since it is easily absorbed by the stomach, lungs and through the skin. Despite this evidence, in India, endosulfan is used even by the state owned organizations like PCK. This shows the indifferent attitude and lack of political will on the part of the governments.

Indiscriminate use of pesticides in cashew garden has been on the increase due to liberal subsidies as well. Till a couple of years ago, cashew growers (Marginal and small farmers) in Tamil Nadu's Thanjavur district were given one literate of endosulfan with five literates of neem oil free of cost for one acre. It was observed that many farmers obtained false eligibility certificates and some of them utilized the pesticides on other crops including paddy, groundnut and black gram in villages like Nadur and Kollangarani, Worse, some farmers sold the pesticides thus availed to wholesale dealers, which was later resold to the farmers. Thus the subsidized pesticide supply meant for cashew has been used for other crops

The Kasargod type of episode of pesticide use will have chain-reactions on human beings and the ecosystem, with many people becoming crippled and mentally retarded. In each household at least one person has been found to suffer from its effects and it is noted that from 19990 to 2001, 156 cases of disorders in just 123 households were recorded by a singly physician in Padre Village alone (table 2). Cancer cases, at 49, were the most prevalent, followed by psychiatric cases, nine individuals committed suicide as they could not bear the torture. Some locals report that they are unable to bear the expenditure for treatment. Aerial spraying of chemicals does not spare drinking water sources, and the water has become yellowish. The groundwater and storms have been totally affected and are now unfit for domestic consumption and for agriculture. This shows the enormity of the issue on the local biotic and abiotic resources.

Table – 2: Health Disorders in Padre Village

Disorders	**No of Cases**
Cancer	49
Mental retardation	23
Congenital anomalies	09
Psychiatric cases	43
Epilepsy	23
Suicides	09

Total	156

Source: Down to Earth (2001).

Business - as usual the manufacturers of chemical pesticides, the pesticide manufactures' association tried to defend the spraying of endosulfan by advertising in dailies that the pesticide was harmless and did not affect people and environment. According to one report, the deputy, commissioner of Kasargod ordered halting of aerial spray of chemicals till the three committees appointed submitted their findings. Although this is a welcome move, the authorities now need to compensate the economic, environmental and emotional sufferings of the locals. Individual studies and expert committee reports have shown that several people especially those below 25 years of age in Padre, suffer from various abnormalities. PCK however, ignored these warnings and continued with aerial spraying of pesticides although the Central Insecticides Board did not give permission either to the government or to private agency for spraying of hazardous chemicals including endosufan; On its part PCK claims that it has been strictly following guidelines like prior announcement and covering of water bodies before undertaking aerial sprying of pesticides.

The National Research Centre of Cashew also reported by withdrew endosulfan from its list of recommended pesticides. In Padre Village, PCK officials went to the victims' houses and sought their signature on papers allegedly stating that their health problems were not due to spraying of endosulfan. The National Human Rights Commission (NHRC) has now served notices to the Indian Council of Medical Research, the chief secretary of Kerala and the ministries of health and agriculture. The NHRC has also took note of the alleged signature collection by PCK officials. But so far not much relief has been addressed towards the affected.

IV. LACK OF SCIENTIFIC RESEARCH AND LEGISLATION

Lack of scientific research studies and lacunae in legislation are also responsible for this situation. Until the CSE revealed the results of its studies, only local medical practitioners had done some analysis, which indicates that neither the state-owned PCK nor the public sector-supported boffins made sincere attempts to objectively examine the implications of pesticide dumping. All state departments' officials have allegedly maintained that the situation cannot be attributed to spraying of synthetic pesticides without ascertain or conducting scientific analyses on the issue.

Another dimension to this issue is the loopholes in the existing legislation pertaining to pesticide formulations, registration and application. There is an obligation on the part of the state to provide a clean environment to its people and Article 21 of the Constitution ensures the right to a clean environment and health as a fundamental right. However, as the Supreme Court has pointed out, due to many lacunae in legislation, there is a need for suitable amendment to the legislation (*The Hindu*, July 22, 2001). The Insecticide Act of 1958 cannot cancel the registration (already given by the Pesticide Registration Committee) to a substance is found later to be hazardous to health and the environment by a scientific study. In addition the apex court observed that there is no coordinated effort among ministries like agriculture, environment and health in the entire episode. There have been no continuous efforts to conduct scientific research or have minimum information about the adverse effects of the use of such pesticides or other chemicals on the living organisms.

The centre has set up the Pesticide Environment Pollution Advisory Committee under the union department of agriculture. However, the Supreme Court has continued to observe public interest litigation on pesticides regarded as hazardous in developed countries being dumped in developing countries including India. This reveals the fact that lack of will power and poor understanding of the importance of environmental issues often prevent the authorities from taking punitive actions on the offenders.

V. CONCLUDING OBSERVATIONS

It is essential to increase the yield levels and production in agriculture. At the same time it should not be compromised with environmental loss and human cost. In the present case it is very clear that the banned pesticide has been used without any precautionary measures. Consequently, the entire biotic and a biotic system has been severely expressed. Local communities are helpless. Proper assessment, rigorous monitoring and environmental implications of synthetic chemicals should be ascertained will before allowing for large scale use. More significantly, the long term implications on the human health and environment need to be studied scientifically for sustainable development.

REFERENCES

[1] Ann (2001), *Down to Earth* 9(19): 28-35.

[2] Mencher, J P (1991), **Agricultural Labour and Pesticides in Rice Growing Regions of India: some Health Considerations**, *Economic and Political Weekly*, XXIV (39):2263-68.

[3] Rajendran S (2002), **Pesticide Spraying in Kerala**, *Economic and Political Weekly*, XXXVII, (23):2206-7.

[4] …….. (1998), **An Exploratory Study on Organic Farming in India**, *Living Resources* for the Millenium, Ed., J Willam (ed), Loyola College, Chennai.