

Invasion of Chemicals in Third World

Greater emphasis on strategies and techniques that reduce opportunities for the invasion

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There was once a balance in nature until man, (the most arrogant animal to colonize the earth) tampered with the systems that nature had ordained. Yet even in relatively recent times the farmer in this country had recognised ways and means of overcoming the consequences of tampering with nature, when his food production activities compelled him to adopt practices of monoculture. Let me illustrate: We, in the Division of Plant Pathology at the Central Agricultural Research Institute, research on plant diseases. One of my younger colleagues has obtained some interesting results in recent work. The older generation of farmers (they were wiser too), traditionally used specific plants as green manure for particular crops. We have now discovered that some principle in *Adhatoda vasica*, a plant used as a green manure, inhibits the growth of a seed and soil-borne pathogen, *Phytophthora vignae*, and suppresses the reproductive activity of another pathogen, *Pythium butleri*, which causes damping-off of many plant species. In other studies, it has been observed, that soil-inhabiting saprophytic fungi such as species of *Aspergillus*, *Penicillium* and *Trichoderma* have an inhibiting effect on species of seed-borne and soil surviving *Alternaria*, a pathogen which attacks crucifer vegetables and other crops. An investigation into the death of onion seedlings in nurseries yielded some very interesting information. The affected seedlings were heavily colonised by the soil-dwelling fungus, *Pythium*. In the preparation of the nursery beds, a fungicide, Morut, had been applied to control diseases that might occur in nurseries. It did not. On the contrary, it induced a problem. Morut contains two

chemicals, fenaminosulf and quinotozene. The former is effective against *Pythium* but is a rather unstable chemical. The latter is ineffective against *Pythium* but kills other organisms in the soil microflora. *Pythium* was one of several fungi in the soil of the nursery beds, which interacted one with another. There were competitive and antagonistic effects among them. The effective chemical in Morut, quinotozene, had eliminated or reduced the population of the competitors and antagonists from the microflora. Fenaminosulf, rendered ineffective by instability, had not been able to check the *Pythium* in the soil. Instead, more favourable conditions were created for the rapid increase of the *Pythium* population. This pathogen was produced in abundance as a consequence of the application of Morut and attacked the onion seedlings in the nurseries. So a chemical treatment, instead of controlling a disease, actually precipitated it. What holds true for the inter-relationships between pathogenic fungi and non-Pathogens, holds true for pests too. Indeed, with insect pests, the situation is expressed more dramatically as the widespread and indiscriminate application of pesticides destroys natural enemies such as predators and parasites, which check the population of pests damaging to cultivated crops, and stimulates the development of pesticide resistant forms. So the prescription, the use of more deadly pesticides and greater frequencies of application do not cure the ills. Instead, they put up costs of crop production, increase environmental pollution, and may even cause effects to destroy an industry, as happened with cotton in northeastern Mexico.

Intensive research must therefore, be directed towards the development of alternate systems of crop protection that take into account aspects which chemical control methods largely ignore the killing of non-target species, disruption of any possible biological balance in nature, the pollution of the environment, health hazards to agricultural workers as well as consumers, and also, costs of production.

Preventing situations leading to chemical invasions

When a pest or disease strikes, the immediate reaction is to reach for the chemical that might "control" the causal agent - curing the ills if indeed they can be cured. But why is it that the prevention of such ills is played on a very low key? Right now, rubber is being devastated by a leaf disease caused by the fungus *Corynespora cassicola*. It is a worrying thought as to whether this fungal strain is a variant that arose in this country or whether it has been introduced from elsewhere. If South American leaf blight were to be introduced here, the rubber industry will probably be doomed not only in Sri Lanka but in the Southeast Asian region as well. The agro-chemical lobby might come up with a bright idea - fungicides might be sprayed to control the fungus. Why not modernize plant protection by securing aircraft for the purpose? Why not indeed! Another private enterprise can be born! But such a course is simply not a practical proposition.

At Batalagoda, the country's premier rice breeding station, a bacterial disease, bacterial leaf blight caused by *Xanthomonas oryzae*, has broken out in epidemic proportions. We have had this disease for a long time but our strains of this pathogen have not been damaging. The bacterium is seed-borne and easily spread in irrigation water. Has seed been introduced to Batalagoda carrying a bacterial strain which can cause serious dam-

age to local rice varieties? Rice blast, caused by the fungus *Pyricularia oryzae*, once caused serious damage to our rice crops. Although there are fungicides that can control the disease, adopting this option will be hopelessly unrealistic. A sustained programme to develop resistant varieties which can withstand the disease has resulted in the problem being brought well under control. The need for fungicides to combat the disease is minimal. But strains of the blast fungus present in Pakistan, if introduced to Sri Lanka, can dramatically change that situation with the introduced strains attacking the varieties locally cultivated. Fungicides to control the disease will then be sought. Such a situation will usher in a prosperous era for agro-chemical marketers but it will be a catastrophe for rice production.

Banning some weapons of the invasion

An invasion requires weapons. And there is a dazzling array of them now. The same principle, that not all deadly weapons invented are used, must be applied in selecting chemicals to combat pests, diseases and weeds. Some should not be used at all.

The International Pesticides Action Network (PAN) based in Malaysia composed of non-government groups from 16 countries have identified a "Dirty Dozen" of chemical pesticides. PAN International has called for a ban on "their manufacture, sales use or trade". These 12 pesticides have been selected "not only for their toxicity but also for the hazards they pose to people in Third World countries". The 12 are:

2,4,5 - T, Aldrin (including Dieldrin and Endrin), BHC/Lindane, Camphechlor, Chlordane (Heptachlor), Chlordimephorm, DBCP, DDT, Ethylene Dibromide, Paraquat, Parathion and Pentachlorophenol. Now some of these are known in the local scene - Aldrin, Dieldrin, Endrin, BHC, DDT, Paraquat, Parathion - although some of them are no longer recommended in Sri Lanka.

LIST OF RESTRICTED AGRO - PESTICIDES 1987

HIGHLY TOXIC AGROCHEMICALS			Sold by Registered Dealers		Sold to Certified Applicators	
A. Insecticides						
Aldicarb	-	+				
Aldrin	+	-				
Aluminium phosphide	-	+				
BHC	+	-				
Chlordane	-	-				
1,2-Dichloropropane (plus)	+	-				
1,3-Dichloropropane	-	-				
Hydrocyanic Acid	-	+				
Magnesium Phosphide	-	+				
Methamidophos	+	-				
Methomyl	+	-				
Methyl Bromide	+	+				
Monocrotophos	+	-				
Omethoate	+	-				
Oxydemeton-Methyl	+	-				
B. Herbicides						
Paraquat	+	-				
POTENTIALLY CARCINOGENIC COMPOUNDS						
A. Insecticides						
Dimethoate	+	-				
B. Fungicides						
Benomyl	-	-				
Captafol	-	-				
Captan	-	-				
Mancozeb	-	-				
Metalaxyl + Mancozeb	-	-				
Thiam	-	-				
C. Herbicides						
2,4-D+Piperophos	-	-				
2,4 D	-	-				
FOR OTHER TECHNICAL REASONS						
A. Insecticides						
Carbosulfan	-	-				
Cyfluthrin	-	-				
Deltamethrin	-	-				
Endosulfan	-	-				
Fenamiphos	-	-				
Fenvalerate	-	-				
Permethrin	-	-				
B. Fungicides						
PCNB (Quintozene)	-	-				
TCMTB - MTC	-	-				
C. Herbicides						
Butralin	-	-				

Source: 'Use of Pesticides in the Plantation Sector' Friedrich-Ebert-Stiftung, Colombo 1988

However, Paraquat formulated as Grammaxone is used in the plantation sector and elsewhere. Just as much as it is standard practice in some places to dip vegetable in insecticide solutions before delivery to the mudalali, it is a practice adopted by some traders to treat green gram with the DDT formulation Gannaxene. Is it not time to slam the basin on them in Sri Lanka?

Even if properly used, according to instructions, pesticides are not without their hazards. The bottle glass on my spectacles, aids after two eye operations, may well be the demonstration of the hazards of pesticides encountered by research with chemicals. Some chemicals are particularly hazardous, the cumulative poisons, those that are carcinogenic or mutagenic. When mercury fungicides were manufactured in Japan and human contamination occurred, several years elapsed before the Minamata disease appeared in its terrible form. It may take 20 - 30 years before cancers appear in persons exposed to carcinogenic agents; mutations are detected generations after exposure to a mutagen. It is an inescapable responsibility to

arrive at decisions and implement schemes taking into account all the information available. Think also of the wretched of the agricultural earth, the plantation and estate labourers and the farm workers, lowly mortals, who will be most exposed to the chemical pesticides - whose task it is to apply them.

The consequences of the hazards they are exposed to may not be immediately felt; but they will be experienced years later in sickness, infirmity and premature death. There can be little solace for the bereaved in invoking the blessings of the Gods after the men are dead, whatever the cost of the ceremonial.

The perceived invasion demands the utmost commitment on the part of the potential victims - to hold the enemy at bay. This is true in the case of chemicals too - the invaders in the topic given to me for this address. And that invasion must also generate the response appropriate to the dangers implicit in an invasion, which more than all else must be determined by a commitment to humanity than by less honourable considerations, the huge profits that they generate for the barons in the pesticide industry.