Nicaragua's revolution in IPM

Nicaragua, a tiny country in Central America fighting against US-supported contra's and a US trade boycott. Facing enormous economic and military problems. The scarcity of important basic needs, like agricultural inputs, is getting more and more problematic. But in order to survive, Nicaragua progressively tries to reduce its needs for imported commodities. Two articles are about the efforts in Nicaragua to diminish the use of pesticides and 'to replace imported pesticides by biological pest control methods that are locally produced and less harmful for human health. This article comes from Carsten Hellpap, a German volunteer working in Nicaragua on IPM. He concentrates on research on such natural enemies as Bacillus thuringiensis and Neoaplectana spp., and with neem tree products. Interesting details which need to be mentioned is that the research on Neoaplectana spp. comes from traditional farmers' strategies. It was noticed (Van Huis et al. 1982) that peasants sprinkle dirt into the whorls of maize to suppress damage caused by the armyworm (Spodoptera frugiperda). Initial research done at a field station showed no effect for this practice, so it was ignored. However, recent work with the parasitic nematode Neoaplectana spp. has shown that mixing nematodes with earth and applying this mixture to the whorls of infected corn plants resulted in up to 100% mortality of the armyworm (Hansen, 1986).

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In 1984 the Nicaraguan Ministry of Agricultural Development and Agrarian Reform (MIDINRA) -together with other institutions like the Biological Faculty of the University in Leon- started a special program in biological and natural pest management. The goals are to develop biological control methods with locally available raw materials and to apply them especially in co-operatives and small farms. The programme includes various biological agents:

1. Bacillus thuringiensis, a bacterium causing a deadly disease in caterpillars of several butterfly and moth species. Biological control agents based on Bacillus thuringiensis are extremely selective. Therefore, they have very low effects on beneficial insects. They are not toxic to mammals (including human beings). Bacillus thuringiensis is commercially produced in the USA under the name "Dipel". However, it is relatively expensive. To treat an area with Dipel would cost Nicaragua three times more dollars than the insecticide "parathion". Therefore, the objective of the project is to produce Bacillus thuringiensis in Nicaragua with local raw materials.
2. Neoaplectana carpocapsae (= Steinernema feltiae), a parasitic nematode of insect species can specially be used against soil pests. It is not toxic to mammals. The project consists of the mass production of the nematode.
3. Trichogramma spp., a parasitic wasp attacking eggs of butterflies and moth. As in the case of Bacillus thuringiensis, this wasp produces only very few side effects on beneficial insects. According to the plans of MIDINRA, several hundred thousand females of Trichogramma shall be reared per week and released in the fields.
4. Neem, a tropical tree whose seeds contain a complex of active substances affecting the development and the behaviour of insects. Neem substances are not toxic to mammals and have only slight effects on natural enemies of pests. They are very effective against defoliating caterpillars, even in low concentrations, and can easily be extracted out of the neem seeds with water or alcohol. Natural insecticides from the neem tree have been used traditionally in India and other Asiatic countries where the tree is endemic. In Latin America they are relatively unknown because of the low number of

trees existing on this continent. Nicaragua has now about 90,000 trees but the number will increase considerably in the next years because the government is frequently using neem in reforestation programmes and is promoting the propagation of the tree on co-operatives and on farms.

In the last seven years the Nicaraguan government has given new land titles to 100,000 peasant families. But agrarian reform does not simply consist of the redistribution of confiscated land. The new owners need support in the form of technical and financial help, agro-inputs and information especially in the initial period. If the support cannot be guaranteed, it will be difficult for the new farms to survive economically. A sufficient supply of agro-inputs is almost possible in regions only accessible with boats and horses after several hours or days of travel. To improve their cultivation techniques, the farmers are dependent on locally available resources. Some of the biological and natural control agents can be produces locally. The neem tree, for example, can grow in most regions of Nicaragua. The tree does not need special treatments and the extraction procedure is simple (comparable to the preparation of tea). Consequently, farmers in remote regions can produce insecticides themselves. One main barrier for the Nicaraguan agro-policy is the scarcity of foreign currency. This year (1986) Nicaragua will get less than 300 million US-dollars for its export. At the same time, the country has to spend 800 million dollars for imports. Because of unfavourable terms of trade, Nicaraguan products have decreased considerably in value on the international market in relation to prices for products from industrialised countries. Agro-inputs like fertilisers and pesticides have a share of 5-10% of a11 imported goods. It is expected that the country may save up to 2 million dollars per year if the biological and natural control programme is realised in its second phase. In addition to the economical advantages, the biological agents will have an important positive impact on the health of peasants and farm workers, and would help to protect the environment. In the seventies Nicaragua was one on the countries in the world with the highest number of human fatalities due to pesticides. More than three thousand acute poisonings a year were reported from 1962 to 1972. However, the reported figures have been only the tip of the iceberg. Many sick farm workers did not seek medical attention because they were too poor to pay the doctor. The degree of chronic poisoning of the Nicaraguan Population is shocking. For decades DDT and other pesticides in the group of organochlorinated chemicals were extensively used.

Pesticides have been polluting streams, lakes and groundwater reservoirs, affecting the supply of drinking water and the survival of fish and shrimps. The excessive use of pesticides also favoured the resurgence of malaria because the mosquitoes developed resistance to three major insecticide groups. One of the priorities of the Sandinista government was to improve the working conditions in the country, including a reduction of human poisonings. DDT and other organochlorinated insecticides were banned. The government promoted educational programmes training peasants, factory and rural workers in pesticide handling, and imported new and safer equipment to reduce the exposure of pesticides to workers. The progress achieved by these measures is encouraging. Nevertheless, the number of acute poisonings is still too high. The number will sharply fall if a considerable part of the chemical pesticides will be replaced by biological and natural methods of pest control.

Considering all these aspects, it is quite clear that biological and natural pest control programmes offer important economical, social and ecological advantages to the country. However, it is unrealistic to expect quick results. The programme is realised in three phases. In the beginning production, mass rearing and extraction procedures are developed, which then are tested on pilot plants. In the third phase, small to medium production units will be

established to supply the internal market with the new biological and natural agents. Every phase needs 2 to 5 years to achieve its projected goals. The main problem here is not to establish a production of the Bacillus or the mass rearing of the nematode, but their consolidation. Unstable structures susceptible to every change in personnel and funding situations are useless. Furthermore the whole programme is based strongly on close co-operation with peasants. Some agents can be produced and used in a decentral way directly on farms and co-operatives. The other agents will be distributed through the usual commercialisation system. Until today the interest of the peasants is high. Most of them have been poisoned by pesticides at least once during their lives and they know quite well the disadvantages of the chemicals for insect resistance and elimination of beneficial insects. However, they are not all euphoric about biological and natural pest management methods because first they want to see that they really work. It would therefore be a mistake to introduce biological methods too early if their success cannot be guaranteed. Considering the great difficulties for European farmers to change from conventional to biological farming, we can imagine what such a change in pest management techniques means for this poor Third World country. Whoever is willing to support the biological and natural control programme or wants more information should contact us.

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