

## **Transition is a matter of watching and observing**

*In 1989-90 the Agriculture, Man and Ecology (AME) Programme, Pondicherry, studied the transition experiences of 12 ecological farmers in South India. Erik van der Werf reveals the difficulties these farmers faced and how, drawing upon their own inventiveness and traditional farming techniques, they managed to succeed.*

Erik van der Werf

Transition is the process of converting a farm from an ecologically unstable conventional ("modern") or traditional farming system to an ecological system with sustainable production. After all needed technical changes have been made, it might still take some time before the transition is complete, especially when perennials play a major role in the new system. A transition can be considered as successfully completed when the farmer feels the yields have stabilised at an acceptable level with the new practices.

Most of the farmers surveyed had 7-10 years' experience with ecological agriculture. Three farms converted from virtually traditional farming, using locally available inputs. Six converted from conventional farming, making considerable use of external inputs of fertiliser, pesticides and information. Three farms were started as ecological farms by the current owners, who had no or limited prior farming experience. Reasons to opt for ecological agriculture varied greatly (Table1). Production of healthy food, environmental aspects and sustainability of the farming system were mentioned by many. Philosophical motivations and the expectation of a better farm income were important in several cases.

### **The transition process**

The greater the difference between the initial and final situations, the more distinct was the process of transition. Where the farming system had been close to traditional (with only limited use of external inputs), one can hardly speak of a transition process. The use of pesticides was stopped, and the little fertiliser were replaced by organic manures. These changes could be successfully made within one growing season without affecting yields. In the other cases, farmers went through a distinct transition over an average of 3-5 years from conventional to ecological farming. Where the original use of external inputs had been high, it took up to 7 years to complete a transition without major negative effects on farm income. When high fertiliser inputs were dropped at once, serious yield decreases resulted (up to 60%). In such cases, farmers had to switch back to using fertilisers and opt for gradual replacement by organic manures. Several farmers said that, as soil fertility improved, yields increased during transition and even surpassed conventional levels. In rice, average grain yields of over 6000 kg/ha were realised under ecological cultivation. Several farmers said that ecological farming enabled them to reach self-sufficiency in foods which earlier had to be partly purchased. Furthermore, a number of farmers mentioned distinct decreases on expenditures for inputs such as fertiliser, pesticides, concentrates and tractor tillage. In certain cases, transition could have been completed faster (e.g. through extra investment in organic manure) if farmers had been better informed about transition and related problems. This lack of information, combined with having to learn ecological agriculture while implementing the transition, had a great impact on the transition and the time needed for it. Farmers said that, with the experience they gained, they would now be able to convert a farm similar to theirs in little more than half the time it had taken them.

## **Changing soil management**

In most cases, changes in soil fertility management were well prepared. All at once or gradually, chemical fertilisers were replaced by N-fixing crops, green (leaf) manures, animal manure, irrigation tank silt and agro industrial by products or waste. Different methods were adopted to improve soil fertility, all focusing on increasing organic matter production on the farm. Fallowing was done to permit natural regeneration of fertility in a degraded area. Green manure crops (*Sesbania* spp and *Crotalaria* spp) were used to reclaim alkaline lands. Six of the 12 farmers increased cattle holdings and produced more fodder to decrease the need for outside grazing, so that less manure was lost. In 3 cases, cattle urine was collected. Composting and green manuring were common. Several farmers collected organic matter from outside the farm (green leaf manure) or purchased it (e.g. manure, irrigation tank silt, granite dust).

## **Changing pest management**

In most cases, the need to change pest and disease management was not foreseen and caused serious problems. Ability to cope with these problems differed greatly between farmers. Adaptations made included changes in the varieties grown (e.g. replacing high-yielding varieties by local ones) and dropping susceptible crops (e.g. cotton). Certain farmers claimed to have less problems after some years. They attributed this to the use of organic manure, creation of an overall healthier field ecosystem and increased presence of natural predators. Pest control techniques were mainly derived from traditional farming. Companion planting, decoctions of insecticidal plants (e.g. *Azadirachta indica*), spraying of diluted cow urine and the use of oil lamps to catch night-flying insects were frequently practised.

## **Changing crop management**

Changes in crop management include increased growing of leguminous and fodder crops, higher cropping intensity through multiple cropping and a shift toward local varieties. In several cases, the number of trees on the farm was increased. A few farmers broadened their crop rotations. Weed control remained unchanged: mainly hand weeding and some intercultivation.

## **Erosion control**

A growth of environmental awareness led to an increase in erosion control activities. Higher priority was given to increasing vegetative soil cover, e.g. through use of cover crops, intercropping and increasing the percentage of perennial crops and trees. Mechanical measures like contour bunding, mulching and decreased tillage were also practised.

## **Farmer traits**

Experience in agriculture and willingness to experiment were farmer traits which made the transition easier. The financial freedom of a farmer directly influenced the length of the transition. Limited investment possibilities (e.g. for soil fertility improvement) prolonged the transition. A family tradition in farming had a positive influence, as traditional farming was an important source of information for the farmers. In South India, farmers normally live in villages and not on the farm itself. However, living on the farm proved to be of major importance for an effective and efficient transition. As one farmer said about the need for

continuous attention in ecological agriculture: "Transition ... is a matter of watching and observing".

### **In summary**

Lack of technical information on ecological farming was a serious problem for all farmers. More than half worked without any information and had to develop their new system on their own. Others made some use of existing extension services and foreign literature. This stresses the importance of individual farmer capacity to observe and analyse the change processes in one's own farm. It also explains the strong influence of farmer traits on the length and smoothness of the transition. The main changes implemented were in soil fertility and pest and disease management. Farmers focused on decreasing use of pesticides and fertilisers, increasing cultivation of perennials and leguminous crops, and intensifying application of organic manure. Specific problems lie in producing sufficient organic material on the farm and lack of knowledge on alternative pest control measures. As such, economic aspects did not prove limiting, but additional off-farm income permitted the financing of a faster transition.

Eric van der Werf

ETC Foundation, PO Box 64, 3830 AB Leusden, Netherlands

### **(Box 1)**

#### **Farmers list ecofarming "musts"**

The transition research was concluded by a meeting in which the farmers listed the following points as essential aspects of ecological farming (Werf 1990):

- The organic matter content of the soil must be increased so as to reduce dependency on chemical fertiliser. This can be achieved by cultivating (N-fixing) fodder crops and green-leaf manure and increasing livestock numbers to produce manure.
- Soil tillage should be minimised and where possible replaced by mulching, cover crops, intercropping and inclusion of trees in the fields.
- Weeds can be used as a (living) mulch to prevent soil moisture evaporation and can be used in compost preparation.
- A variety of selected trees should be planted to provide cattle fodder, improve the soil, supply green-leaf manure and serve as a wind break.
- Drought-resistant species should be preferred for annual crops and trees.
- Erosion control by contour bunding and soil cover is essential.

### **(Box 2)**

#### **The Reddy farm**

The Reddy family lives on a 4.2 ha irrigated farm 25 km east of Bangalore, Karnataka. They have been farming there since 1975, initially under conventional management using high levels of external inputs such as fertiliser, pesticides and tractor ploughing. As a conventional farmer, Mr Narayana Reddy was twice elected most progressive farmer of the region. However, his profit margin was low due to the high costs of the external inputs. It was a

combination of these high costs and the environmental effects he saw in his farm which motivated Mr Reddy to switch to ecological agriculture. In 1979 the family completely stopped using external inputs and yields plummeted to 40% of the former average. It was then decided to use fertilisers and pesticides again and reduce them gradually, while increasing the amount of organic manure. The yields remained depressed in the first 3 years but then started to improve. After 7 years, fertiliser use was stopped completely and crop yields were back at the pretransition level.

**Soil fertility.** Decreasing the use of fertiliser required increased inputs of organic manure. This was done initially by bringing more organic manure into the farm: leaves were collected on roadsides and in the forest, tank-bed silt was carried in and animal manure was bought. Gradually the on-farm capacity to produce organic matter was increased. Green manure crops (*Sesbania sesban* and *Crotalaria* spp) were included in the rotation in the first 4 years. These were later replaced by pulses, of which the residues were ploughed under after harvest. Crop residues formally burned were used for compost or mulch. Tillage could be decreased in the latter part of the transition due to increased microbial and earthworm activity.

**Pests and diseases.** Pests were controlled by spraying soapy water, herbal extracts and diluted cow urine. Changes in cropping pattern and enhancement of soil health resulted in sufficient pest and disease control. The only remaining problem is an insect pest in guava for which no satisfactory organic control method has been found. If this cannot be solved, the guava will be replaced by another tree crop.

**Crop management.** Cropping patterns were changed to include more leguminous species and avoid monocultures. Species sensitive to pest and insect attack on account of unsuitable climatic conditions (cabbage and cauliflower) were dropped. The whole farm is now developing into a widely spaced orchard with annual crops growing between the trees. The bunds of the irrigation channels were planted with Napier grass and *Leuceana leucocephala*, using the water seeping and infiltrating in the channel sides.

**Livestock management.** Since starting the transition. Mr Reddy gradually raised his cattle numbers from 2 to 10, as the farm's capacity to supply the necessary fodder increased. Furthermore, rabbit breeding and sericulture were taken up, and more sheep and local poultry were kept. All animals are fed from the farm's own resources. A new cattle shed was built to facilitate collection of dung and urine and to free the cattle from their ropes.

**Socio-economic aspects.** Labour increased greatly during the early years of transition, especially for collecting external organic manures. Establishing a new farming system was a matter of trial and error, each error resulting in an extra labour demand. Now, as a result of diversification of farm activities, distribution of labour over the year is more even than before transition. During the first years of transition, net returns remained stable. The slight decrease in yields was counterbalanced by a decrease in costs. After 5 years the net returns improved enormously; soil fertility was improved, crop yields returned to the previous level and the planted trees started yielding. The net returns have now stabilised at a higher level than before transition.