Sustaining biodiversity in wetland paddy

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In conventional wetland paddy cultivation all natural vegetation is removed during the establishment of the crop. This in turn eliminates all natural animals living within the ecosystem. In the humid tropics where wetland paddy is widely grown and the natural ecosystem can be very rich, this complete elimination of biodiversity could have serious repercussions. To reduce the loss of biodiversity, bunds can be left with vegetation. Our experience is that this is a profitable and ecologically sound approach.

Biodiversity eliminated

Paddy is normally grown in marshy land or converted to marshy condition by irrigation not because paddy needs inundated conditions but because it can tolerate such conditions. This ability has been used to control weeds by keeping paddy fields inundated. In Sri Lanka, a paddy field consists of several small units known as *liyaddas*. A *liyadda* is encircled by bunds and is perfectly leveled to retain water at a uniform depth. Bunds take 15-30% of the land area, depending on their slope.

Bunds are cleaned during preparatory tillage. The sods are thrown into the *liyaddas*, incorporated into the muddy soil and the colonies of ants that inhabit them are drowned: this reduces the ant population. After cleaning, the bunds are repaired, planed and plastered. The *liyaddas* are puddled and kept submerged for 3 to 4 days before sowing or transplanting takes place.

Between cleaning the bunds and three weeks after sowing or transplantation there are hardly any plants other than paddy in the *liyaddas*. During this period all animals, insects, worms and reptiles either leave the area or die of starvation. Hardly any birds are seen, as there is no food for them. Only insects and microbes that live on paddy plants thrive well. Though there is food for some predators and parasites, there are no plants to host them. In this condition pest attack and disease is unavoidable. The use of agrochemicals to combat pests and diseases degrades soil life. When high doses of chemical fertilisers are used, plants become even more vulnerable to pests and disease.

Weedy bund management

The '*new kekulam*' method of paddy cultivation, described in the ILEIA Newsletter Vol.13-3 provides an alternative to this disastrous conventional method of paddy cultivation. In this method weeds are kept on the bunds. Repairs are made with sods from the base of the bund. Vegetation gradually becomes more natural and after a few seasons the bunds become solid contours unlike those that receive regular seasonal cleaning and plastering. Bunds become so strong that they are able to resist damage by wild animals and floods.

Farmers experience many benefits from weedy bund management:

- Much of the natural vegetation is retained at least on the land covered by bunds.
- Together with the natural vegetation all forms of animals, insects and worms reappear. In this way the natural ecological balance is brought back. This is important for pest control in paddy cultivation. In Sri Lanka we have six dominant insect paddy pests. To keep their population down there are 27 predator insects. Both types of insects live in equilibrium on the bunds. In this way damage to the paddy crop and hence pest control can be kept to the minimum.
- Ants collect weed seeds from the fields during the harvest period when paddy fields are dry and store these seeds on the bunds. This reduces the amount of potential germinable weed seed in the next cultivation seasons. In the *kekulam* method weed control on the *liyadda* is further enhanced by mulching. Mulch of rice straw and loppings from the *Gliricidia* for example, are applied directly after sowing. Irrigation is applied once to soak the mulch. Thereafter, during the vegetative period, the soil is kept moist to ensure its aerobic condition and to enhance soil life. In this way the growth and yield of paddy is enhanced and weeds are controlled effectively without the use of herbicides and with minimal labour input. In addition there is a 50% saving on irrigation water.
- Also predators like birds, owls, reptiles and mongeese are attracted so that damage from crabs, rats and also to some extent from insect pests is reduced.
- Labour requirements are reduced by about eighteen to twenty man days per season and this brings down the cost of production.

The practice of weedy bund management is very simple, it saves labour and money and regenerates biodiversity. ■

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Reference:
- Upawansa GK, 1997. **New Kekulam rice cultivation: a practical and scientific ecological approach**. *ILEIA Newsletter*, Vol. 13-3 pp. 20-21.

photo: GK Upawansa

Effect of mulching on rice root systems