Integrated Pest Management and Aquatic Life Management: A Natural Partnership for Rice Farmers?

GESA HORSTKOTTE
CLIVE LIGHTFOOT
HERMANN WAIBEL
PETER KENMORE

Over the last decade, Green Revolution rice technology has been subject to increasing criticism. Yields on experiment stations in Southeast Asia not only have declining growth rates, but also the highest yields have been falling steadily. It appears that high inputs of chemical pesticides do not sustain yields and do pollute the environment. Integrated Pest Management (IPM) was developed to reduce pesticide usage[1].

The development of culturing aquatic organisms such as fish, frogs and shrimps in ricefields, was developed to increase income and to improve farmers' diets. Although promoted as rice-fish culture, there are more aquatic organisms to be found in the ricefields than just fish. This practice shall here be called 'Aquatic Life Management' (ALM). It requires unconventional pest management strategies since aquatic organisms do not tolerate high levels of pesticide use.

Despite much promotion, adoption of either management strategies, IPM or ALM, has been slow. The risk for the farmer associated with culturing fish or other aquatic organisms in ricefields under conventional pest management strategies is high compared to the possible gains. IPM, on the other hand, often relies on complicated procedures like insect identification, sampling, population characteristics of each pest and knowledge of control measures and their impacts.

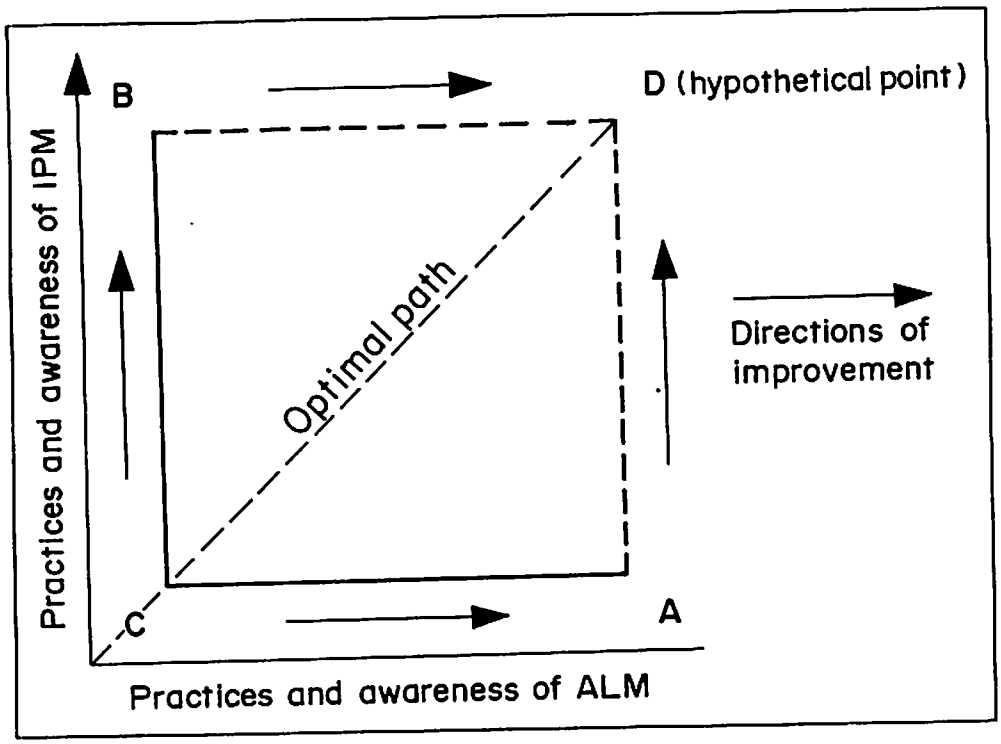
IPM until now has predominantly been a 'no spray'- strategy; it didn't always offer sufficient incentives to the farmer. In some cases it didn't even reduce production costs because the observed economic thresholds[2] led to higher pesticide use than under the conventional technology of calendar-based spraying. In this context ALM can play a crucial role as a vehicle for sustainable crop technologies such as IPM. Moreover, both strategies reinforce each other. The potential of ALM can only be fully exploited in a pesticide-free environment, while IPM becomes more attractive when it is complemented by the generation of additional income from fish.

These observations suggest a complementarity of IPM in rice and ALM. Our hypothesis is that farmers who become more skilled in IPM will gradually change their perceptions towards aquatic life in a positive way, and will start to make management decisions in favor of aquatic organisms. Farmers who already practice ALM are hypothesized to react accordingly

An integration of fish into a farmer's ricefields will only be possible with the use of environmentally sound pest management strategies. (Photo by Clive Lightfoot)

[1]Integrated Pest Management is a strategy that utilizes various tactics or control methods - cultural, plant resistance, biological and chemical - based on frequent monitoring of pests.

[2]The economic threshhold is defined as the pest population at which the expected crop losses become bigger than the cost of control measures.



- the more skilled they become in ALM, the more receptive they will be to IPM practices. Both developments are seen as a complementary and natural process in which the adoption of IPM practices goes hand in hand with an advanced level of ALM skills. The diagram illustrates this concept - the vertical axis represents farmers' awareness of IPM, as indicated by the kind of practices they are using (increasing proficiency and skills), whereas the horizontal axis ranks different ALM practices according to their complexity and refinement, thus representing farmers' awareness of aquatic life management.

An ICLARM collaborative research project with the University of Goettingen/ Germany, International Rice Research Institute, Antique (Philippines) Integrated Area Development (ANIAD), the Philippine Department of Agriculture Region VI and FAO will be undertaken to explore this relationship. The study requires initial understanding of the process by which farmers move from the three starting points A, B and C in the diagram and of the direction in which they are moving. To do this, the decisionmaking process of the farmers with regard to pest and aquatic life management needs to be explored. It is expected that farmers who are moving up the IPM scale will also move up the ALM scale and *vice versa*. They will start to see more and other options with regard to the opposite scale than farmers who remain very low on that scale.

In the course of analyzing the relationship, populations of farmers will be identified which can be located at positions A, B and C of the diagram; they will then be observed in order to follow their evolution in terms of both IPM and ALM. One of the first tasks has to be the establishment of a scale for both IPM and ALM awareness and practice which will then represent the two axes. Three populations can readily be located with existing practices as follows: population A stands for farmers who have a high awareness and high proficiency in ALM but who are very low on the IPM scale; these farmers are culturing fish in their ricefields but instead of using IPM they spray chemicals that are less harmful to fish. Population B represents farmers with a high understanding of IPM practices but who are very low on the ALM scale; these farmers have already turned to ecosystem management[3] of the pests in their ricefields, but they haven't yet considered aquatic life as part of their management decisions. In population C, farmers are both low on the IPM and on the ALM scale and can thus be taken as farmers who practice the 'old version' of IPM according to the Surveillance and Early Warning System (SEWS) based on fixed thresholds[4].

According to the central hypothesis, a move towards position D would seem to be the most natural and desirable development; the question is, will it happen?

G. HORSTKOTTE *is an Agricultural Economist from Göttingen University, Göttingen, Germany, now with ICLARM for the tenure of this project;* C. LIGHTFOOT *is Farming Systems Specialist, ICLARM;* H. WAIBEL *is Professor for Agricultural Economics at the University of Göttingen, Germany; and* P. KENMORE *is Program Coordinator of the Regional FAO Program on IPM in Rice, Manila, Philippines.*

ICLARM Contribution No. 885.

[3]Ecosystem Management is a new approach to IPM in which farmers take weekly records of their ricefields and its environment with regard to key factors such as pests/predator densities, plant health, field conditions, weather, and current management treatments. Control methods take into account all the observations, giving special emphasis to the population of beneficial insects and minimizing pesticide use.

[4]Farmers who follow the conventional recommendations of rice monoculture with high chemical input can be placed at the origin of this diagram.