Ecological Engineering Towards a Sustainable Integrated Pest Management (IPM) Program in Rice and Rice-Based Farming System.

Study 1. Impact of Palayamanan® on Conservation Biological Control in Rice and Rice-based System

GS Arida and LV Marquez
Palayamanan®

- Diversified and Integrated Farming Systems (DIFS) concept that will provide farmers with an alternative solution to the continuously declining yields and decreasing profitability from rice monoculture.

- Palayamanan was coined from the Filipino words *palay* which means paddy rice, and *kayamanan* which means wealth.
Palayamanan® highlights a diverse and multi-storey cropping system, an integrated and continuous animal production, aquaculture and efficient utilization of resources and by-products as farm inputs.
Palayamanan Sites in the Philippines

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>(No)</th>
<th>Provinces</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Colleges and Universities (SCU’s)</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Local Government Units (LGU’s) and DA Regional Field Units (DA RFU’s)</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Number of Village sites</td>
<td>154</td>
<td>13</td>
</tr>
</tbody>
</table>
Arthropod community structure in a rice ecosystem (by species) in Indonesia

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herbivores (Phytophages)</td>
<td>127</td>
<td>(16.6%)</td>
</tr>
<tr>
<td>Parasitoids</td>
<td>186</td>
<td>(24.4%)</td>
</tr>
<tr>
<td>Predators</td>
<td>308</td>
<td>(40%)</td>
</tr>
<tr>
<td>Detritivores and plankton feeders</td>
<td>145</td>
<td>(18.9%)</td>
</tr>
</tbody>
</table>

Settle et al., 1996
The Rice Ecosystem and Management of Rice Insect Pests

- Tropical Asian rice fields - an ecosystem unrivaled by any other in the world in terms of complexity

- Rich communities of naturally-occurring beneficial organisms (predators and parasitoids) in the absence of toxic pesticides

- Most studies suggested that pest management of insect pests for much of tropical rice must be based on natural control, rarely supplemented by insecticides
Study 1. Impact of Palayamanan® on Conservation Biological Control in Rice and Rice-based System

To document the role of *Palayamanan* as refuge to beneficial organisms that can provide a sustainable management of insect pests in surrounding areas with large rice monoculture.
Fields monitored

1. CPD rice field
2. Palayamanan ® rice field
3. Palayamanan ®

Crop stages sampled:
- Seedling
- Tillering
- Booting
- Milking
Prey enrichment method (Parker, 1971); Egg bait (IRRI)

Exposed for 3 days in the field

Five gravid females allowed to oviposit for 24 hours

Stems dissected in the lab to determine parasitism of eggs
Total number of beneficial organisms and rice hoppers recorded

2011 Dry season

2011 Wet season
Percent (%) parasitism of BPH eggs.
The higher population of natural enemies in the rice field in Palaymanan was attributed to the proximity of the field in an area with high vegetation diversity that includes several kinds of vegetables and weeds that serve as source of food and refugia for these beneficial organisms.

Palayaman vegetable field serve as refugia of beneficial organisms as shown by the number of predators and parasitoids recorded and percent parasitism of BPH eggs.
Ecological engineering is an important component in the management of insect pests to reduce/avoid insecticide misuse in rice and other crops.

Ecological engineering will address our concerns on:
- Production costs,
- Health and safety of farmers and consumers,
- The environment, and
- Ecological stability and sustainability.
THANK YOU
LEGATO/Ecological Engineering Information Campaign


- www.philrice.gov.ph (Top Stories) Plant veggies; reduce rice pests. Written by the web team

- Lecture on Ecological Engineering - Farmer leaders in Organic Farming from Taiwan, Korea and ASEAN countries - June 3-4, 2012, Hosted by PARAGOS-PILIPINAS
Newspaper articles

- The Manila Times - June 1, 2012
  Written by: Neil A. Alcober
  Title of article: Dirt-cheap strategy lessens rice pests

- Business Mirror - June 5, 2012
  Written by Ramon Efren R. Lazaro
  Title of article: Vegetables around rice fields can reduce pests

- The Manila Times - June 16, 2012
  Written by Lydia C. Pendon
  Title of Article: Vegetables intercropped with rice shoo pests
Radio/TV program
Radio station: 5:20 in the morning, DZMM
ABSCBN network June 17, 2012