

Good practices for rice farming in accordance with biodiversity conservation

Organic Rice Farming

Avoid using chemicals or synthetic substance, such as pesticide or chemical fertilizer, in production.

Rice production in Agroforestry System

Emphasize on forest ecosystem imitation by combining between agriculture (farming, plantation, ranch, fishing) and growing perennial plants.

System of Rice Intensification – SRI

Emphasize on rice field environment management such as single rice planting which lower water and seeds usage which, in turn, minimize cost and increase product.

Sustainable Rice Platform – SRP

Produce rice according to international standard such as plan for cost reduction and reducing greenhouse gas emission and correct chemical using which make quality and environmentally friendly rice production.

Good Agricultural Practices for Rice – GAP

Emphasize on environment, health, safety and security of farmers in overall production. Appropriately use chemical fertilizer and pesticide to produce quality and safe rice.



Biodiversity Indicators in rice field ecosystem is living organisms found in the rice field and the surrounding areas which reflect environmentally friendly production and encourage conservation and restoration biodiversity in the area.

Criteria for biodiversity indicator in rice field ecosystem

- 1. Indicate biodiversity in rice field. They must be bio-indicator species, keystone species or umbrella species.
- 2. Be conservable species such as rare species, endemic species or endangered species according to IUCN Red List and Thailand Red Data



- 3. Be living organisms that benefit rice production such as pest control, and enhancing rice growth and healthy.



- 4. Support nutrient cycling such as decomposition, biogeochemical nitrogen fixation.
- 5. Benefit human such as food, medicine or usable wood.
- 6. Benefit other organisms such as food, habitat, and seed dispersal.
- 7. Maintain environmental condition such as carbon dioxide absorption, poisonous substance absorption and soil erosion protection.
- 8. Benefit culture and recreation such as potential to be ecotourism site or identity of the local.



Biodiversity Indicators in Rice Field Ecosystem

A material for public distribution under the Project on Identification of Good Practices and Indicator for Agricultural Biodiversity



If any living organism has negative impact to rice production such as being pest or germ, the score of being biodiversity indicator in rice field ecosystem would be deducted.






Biodiversity indicators in rice field ecosystem


Biodiversity indicator in rice field ecosystem is living organisms found in rice field and surrounding areas. The organism must reflect good practices in accordance with biodiversity conservation and sustainable use. The organism is divided into four groups as follows;

Plants


Most of them are legumes and floating aquatic ferns which have potential in biogeochemical cycle and adding organic matters which enhance rice productivity. In addition, there are flowering plants which can attract insects. This can stabilize the rice field ecosystem for resilience of environmental changes. These plants can also be food and medicine or be transformed into dye, tools or material. Also they can be ornamental plants which can absorb poisonous substances. These plant species can be listed as follows:




Phasey bean (*Macroptilium lathyroides* (L.) Urb)




Water fern (*Azolla pinnata* R.Br.)




Garden spurge (*Euphorbia thymifolia* L.)




White popinac (*Leucaena leucocephala* (Lam.) de Wit)



Sesbania (*Aeschynomene aspera* L.)



False daisy (*Eclipta prostrata* Linn.)



Butterfly pea (*Clitoria ternatea* L.)

Vertebrates

There are mammals, birds, reptiles, amphibians and fish. These species support ecosystem balance and benefit the production and other organisms and some of them have culturally importance. However, many of these species are vulnerable, endangered or critically endangered and those identified for being beneficial to rice production, survival of other species and preservation of cultural, traditional and recreational values. These animal species can be listed as follows:

Mammals




Wrinkle-lipped free-tailed bat (*Tadarida plicata*)




Small asian mongoose (*Herpestes javanicus*)


Birds




Black kite (*Milvus migrans*)




Black-winged kite (*Elanus caeruleus*)




Brahminy kite (*Haliastur indus*)




Sarus crane (*Grus antigone*)




Greater coucal (*Centropus sinensis*)




Indochinese roller (*Coracias affinis*)




Long-tailed shrike (*Lanius schach*)




Asian golden weaver (*Ploceus hypoxanthus*)




Yellow-breasted bunting (*Emberiza aureola*)




Asian openbill (*Anastomus oscitans*)




Glossy ibis (*Plegadis falcinellus*)




Greater painted-snipe (*Rostratula benghalensis*)



Black-winged stilt (*Himantopus himantopus*)



White-breasted waterhen (*Amauornis phoenicurus*)



Pheasant-tailed jacana (*Hydrophasianus chirurgus*)

Reptiles



Black marsh turtle (*Siebenrockiella crassicollis*)



Monocled cobra (*Naja kaouthia*)



Indochinese rat snake (*Ptyas korros*)



Radiated ratsnake (*Coelognathus radiatus*)



Green pit viper (*Trimeresurus* sp.)




Snail-eating turtle (*Malayemys* sp.)



Butterfly lizard (*Leiolepis belliana*)

Invertebrates


Most of them are insects which help in reducing number of pest insects. They are also be food for other organisms such as fish or frog or even human. Some of them can be indicator for water quality. In addition, some planktons and snails can play a major role in food web. These animal species can be listed as follows:




Dragonfly (Libellulidae)




Damsel fly (Zygoptera)




Lady beetle (*Micraspis discolor*)




Ladybird beetle (*Menochilus sexmaculatus*)




Ground beetle (*Ophionea ishii ishii*)




Earwig (Dermaptera)




Rove beetle (Staphylinidae)



Mantis (Mantidae)




Long-horned grasshopper (Tettigoniidae)




Short-horned grasshopper (Acrididae)




Dwarf bee (*Apis florea*)




Cricket (Gryllidae)




Firefly (Lampyridae)




Assassin bug (Reduviidae)



Wolf spider (*Lycosa pseudoannulata*)



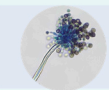
Long-jawed spider (*Tetragnatha* sp.)




Pond snail (*Filopaludina martensi martensi*)

Microorganisms

The microorganism indicators are fungi which benefit rice productivity. This fungi are only found in rice fields that have good management and correspond with the biodiversity conservation and sustainable use. They have potential in environment control including toxic reduction. The species are



*Aspergillus* section *Nigri*



*Cladosporium* sp.

In the other hand, there are fungi such as *Fusarium solani*, *Curvularia* sp. and *Nigrospora* sp. which are causes of many diseases in rice. These fungi are found in excessive chemical usage rice filed which indicate imbalanced ecosystem.

Fishes



Somphong's rasbora (*Trigonostigma somphongsi*)




Least rasbora (*Boraras urophthalmoides*)



Bighead catfish (*Clarias macrocephalus*)



Climbing perch (*Anabas testudineus*)




Snakehead fish (*Channa striata*)




Silver barb (*Barbus gonionotus*)



Swamp eel (*Monopterus albus*)




Sand goby (*Oxyeleotris marmorata*)



Ricefishes (*Oryzias* sp.)




Giant snakehead fish (*Channa micropeltes*)




Grey featherback (*Notopterus notopterus*)


Amphibians




Rugosed frog (*Hoplobatrachus rugulosus*)




Rough-skinned floating frog (*Occidozyga lima*)



Grass frog (*Fejervarya limnocharis*)



Green-backed frog (*Hylarana erythraea*)



Stripe-backed frog (*Hylarana macrodactyla*)

Source of photos

- Plants: Phruksaphop Srisuk
- Wrinkle-lipped free-tailed bat: Kittapat Luechang
- Small asian mongoose: Wichayanan Limparungpatthanakij
- Birds: Wichayanan Limparungpatthanakij, Kulpat Saralamba, Nattawat Paewkratoke
- Reptiles: Montri Sumontha
- Amphibians: The Zoological Park Organization of Thailand
- Fishes and Pond Snail: Chavalit Vidthayanon
- Spider: Wimonwan Chotiwong, Department of Agriculture
- Other insect: Prakai Ratchanuwong, Umaporn Thongrob
- Fungi: Piyangkun Lueangjaoenkit