# Socioeconomics of the Integrated Rice-fish Farmer System in *Teluk Intan, Perak, Malaysia*

Bambang Surya Adji Syahputra
*Faculty of Science & Technology, Agrotechnology Department,Panca Budi University, Medan, North Sumatera,Indonesia*

Keywords: Socioeconomics, rural area, integrated, rice-fish system

Abstract: The research aims to analyze the characteristics and socioeconomics of farmers in rural area at TelukIntan, Perak, Malaysia especially their roles in integrated rice-fish system. Data were gathered from farmers having roles in integrated rice-fish farming system (30 samples) using interviews with questioners about socioeconomic background, both past and present. Data related to their roles in rice-fish farming system and their related functions in the development of the rural area and economic welfare were presented. All farmers in this study area were Malaysian Muslims. The average age of farmers in this study was 55.43 years and almost 33.33% of the farmers were above the age of 60 years. Most farmers in the research location faced problems of limited resources, low output prices, insufficient irrigation, pests, insufficient capital, and weedy rice. As weedy rice is the most serious problem in the rice fields, most farmers hope assistance from appropriate agencies to solve this problem. Basically, rice-fish system changes the operational cost from buying pesticides to buying fingerlings and equipments for rice-fish culture. The system also reduces the dependency of rice fields on pesticides.

## 1 INTRODUCTION

Fish (both marine and freshwater) is an important source of protein in Malaysia. Most of the freshwater fish such as catfish, snakehead and snakehead gourami are obtained from rice fields, especially from the Kerian-Sungai ManikIrigation Area of northwest Perak (Ali, 1988a). Malaysians' annual per capita consumption averages around 45 to 50 kg, and rapidly increasing with the growing population. It is also projected that Malaysians' demand for aquaculture production will exceed 15 million metric tons by the year 2010 (CheRohani*et al*, 2002).

Certainly, there is a considerable potential for further expansion and development of rice-fish farming systems in Malaysia, both in term of available resources and supporting infrastructure and services (Kechik, 1995). Aquaculture (including rice-fish farming systems) is being in recognition by the government and has been identified as one of the thrust areas for development under the New Agricultural Policy 3 (1991-2010). By the year 2010, aquaculture production is projected to reach about 200,000 tones and contribute about 15% of the annual total fish production (CheRohani*et al*., 2002).

Fish provides additional income especially to tenant farmers, who account for 60% of the rice farmers in Peninsular Malaysia (Tan *et al*., 1973 and Syahputra, 2016). Malaysia, with over 350,000 ha of rice fields is available for potential rice-fish farming, having a prospect in the increase of fish production using the system and this remains good (Ali, 1992; Sinniah *et al*., 2012 and Syahputra *et al*., 2013). In spite of the intensive use of herbicides and pesticides, rice-fish farming is still the most important source of freshwater fish in the country. Currently, there are real man-power constraints for development of rice-fish farming. To increase the production of fish, small-scale farmers are encouraged to take up integrated rice-fish production.

A potential development strategy for rice-fish farming system would be to conduct research and establish a pilot prototype farm in the target area in order to demonstrate firsthand new methods and management techniques to the farmers. This approach should also be supplemented with a network of extension officers helping to quickly



Adji Syahputra, B.
Socioeconomics of the Integrated Rice-fish Farmer System in Teluk Intan, Perak, Malaysia.
DOI: 10.5220/0008882701120117
In *Proceedings of the 7th International Conference on Multidisciplinary Research (ICMR 2018)* - , pages 112-117
ISBN: 978-989-758-437-4

disseminate new information obtained (Ali, 1992). Indeed new culture methods and management techniques are needed to invigorate the system. Efforts to increase yields should also involve upgrading and modifying the existing systems rather than introducing new and untested techniques, since rice-fish culture is essential as symbiotic form of relationship that has taken hundreds of years to evolve (Ruddle, 1982). In Malaysia, rice-fish farming system is important not only to produce freshwater fish, but also to act as a genetic reservoir for important aquaculture species such as catfish and snakeheads (Ali, 1992).

Although rice-fish farming has great potential in Malaysia, no research is currently being conducted to improve the prevailing culture and management techniques. Most studies were carried out in the 1940s and 1950s by Soong (1947, 1948, 1949, 1950, 1951, 1955) and by several researchers later in the early 1970's during the transition period from single to double rice cropping system (Tan, 1971; Yunus and Lim, 1971; Moulton, 1973; Tan, 1973; Tan *et al*., 1973 and Syahputra *et al*., 2016). Currently, research on the basic ecology of rice-fish farming is being conducted primarily by Ali (1987a, 1987b, 1988, 1990) in order to formulate and design more effective culture techniques and management strategies that will counteract the declining fish harvest (Ali, 1992).

The development of aquaculture especially freshwater fish culture in Malaysia is relatively recent. Freshwater ponds spearheaded the production of freshwater cultural systems, with 71.40% (35,678.70 tons) of the total freshwater production. In terms of value, it recorded a decrease of 5.5 percent from RM 185.75 million to RM 175.53 million (Annual Fisheries Statistics, 2003).

The oldest irrigation scheme in Malaysia is the *Kerian* Area of Northwest Perak. Located approximately 60 km south of Penang, the area covers 25,000 ha of rice fields (Tan *et al*., 1973). In the early 1970's, double cropping of rice was implemented using water from the Bukit Merah Reservoir and the Kerian River (Tan *et al*., 1973). The area was well known for rice field fish and high freshwater fish production even though yields have declined following the introduction of double cropping of rice (Ali, 1998).

Rice-fish farming system in Malaysia is essentially a capture system, whereby wild fish are trapped in the rice fields and subsequently grown, and harvested at the end of the rice season (Tan *et al*, 1973; Ali, 1988a). A sump pond, dug at the lowest section of the fields, provides shelter for fish during the periods of low water level and high water temperature and also acts as harvesting basin (Tan *et al*., 1973). No effort to improve the farming of fish such as contraction of perimeter trenches or repairing of dikes to retain fish is carried out (Khoo and Tan, 1980). Mannering to enhance plankton production, stocking or restocking, and feeding of fish are also not conducted (Ali, 1988a) and primarily water fertility depends on fertilization.

As pointed out earlier, the introduction of the double cropping system of rice, has been reported declined in fish yields (Tan 1973, Tan *et al*., 1973). Intensive cultivation of rice using high yielding varieties, greater use of pesticides and herbicides, and shorter growing seasons, resulted in low fish harvests (Moulton, 1973).

## 2 METHODOLOGY

The study was initiated to investigate socioeconomic analyses of integrated rice-fish farming system on small holders' in Teluk Intan, Perak, Malaysia. Iinterview with questioner equipment were also conducted.The random sampling procedure was used to select sample for the socioeconomic survey. Data were gathered from farmers who have roles in integrated rice-fish farming system (30 samples). Questionnaires were distributed to smallholders around Sungai Manik and Labu Kubong in TelukIntan. Some of farmers were included in this study. The variables in the analysis of rice-fish farmingsystem include farm characteristics, land used, cultural techniques, input and output, and source of capital. Farm characteristics indicated whether farm was used for subsistence or commercial gain. Cultural techniques are mainly influential in increasing farm production and income. Cultural techniques are indicated by production equipment, seeds, fertilizers, pesticides and labor. In term of labor, it includes both family members and hired workers. Meanwhile, inputs constitute those factors that accelerate or increase rice-fish yield levels. Data were gathered from respondents using in-depth interviews, covering their life and socioeconomic background, both past and present. Data related to their roles in agriculture and their related functions in the development of the rural area and economic welfare were gathered.

# 3 RESULTS

All farmers in Sungai Manik and LabuKubong irrigation area were Malay Muslims. The average age of farmers in this study was 55.43 years. However, almost one quarter (33.33%) of the farmers was above the age of 60 years; only 16.67% were below 40 years of age (Table 1). About 73.3% of the farmers had primary education for 6 years and 13.3% had education in higher school level (PMR & SPM) while 13.3% had some education that was below the primary level (Table 2).

Table 1: Age distribution of farmers in Sungai Manik-Labu Kubong irrigation area.

| Age | No | % |
|---|---|---|
| Less than 30 | 2 | 6.67 |
| 30 - 39 | 2 | 6.67 |
| 40 - 49 | 3 | 10.00 |
| 50 - 59 | 10 | 33.33 |
| 60 - 69 | 9 | 30.00 |
| 70 and above | 4 | 13.33 |
| Total | 30 | 100 |

Most farmers (66.7%) reported that they generally worked only in their own farms, A few stated that they had also some non-agricultural occupation such as running a small retail business (16.7%), fishery (3.3%), government retirees and 40.0% with other multiple occupations and work outside their own farms (labor, catch fish in the rivers, lorry driving, member of local volunteer corps, village headman, petty trading, etc) (Table 4.29). The average size of the farm families was 7.4 persons. About 46.67% of the sampled households had 8 persons and more, while 3.33% had only 1 person (Table 3).

Table 2: Education distribution of farmers in Sungai Manik-LabuKubong irrigation area.

| Education | No | % |
|---|---|---|
| SRK | 22 | 73.33 |
| SPM | 8 | 26.66 |
| Total | 30 | 100 |

Many farmers lived within a short distance from their rice field and this is particularly true for farmers in LabuKubong and Sungai Manik. Almost all farmers had a separate storage shed of very simple nature for equipment, fertilizer, pesticide and some farmers had tractor and save in this store, a small “pen” or fish pond for their poultry (chickens or ducks) and livestock. All of farm dwelling houses in this study have electricity and domestic water piped supply.

Table 3: Employment distribution of farmers in Sungai Manik-LabuKubong irrigation area.

| Employment | No | % |
|---|---|---|
| Fisheries | 1 | 3.33 |
| Small business | 5 | 16.67 |
| Retired | 3 | 10.00 |
| Farmers | 9 | 30.00 |
| Others | 12 | 40.00 |
| Total | 30 | 100 |

Farmers receive agricultural information from a variety of sources including the Agricultural Department, Farmers’ Associations, Farmers’ Area Association, Department of Information, friends, village leaders, shopkeepers, NGO, etc. Eighty percents of farmers reported that they received information from the Agricultural Department on seeds, fertilizers, pest control or new cultivation techniques. Some of the farmers read agricultural leaflets distributed by the Department and although they found them useful; however most of themread very infrequently, often twice or three times a year. The main sources of information continue to be from the agricultural extension and word of mouth from friends. Field trip undertaken to improve farming techniques seemed to be very popular among farmers. As they always had been out of their village to study new ways of improving farm production. Most of these trips were just going to other villages or districts, but some farmers reported going to another State on study trips. In rural institutions, most farmers were members of the Farmers’ Area Associations (FAA), only a few did not join as the reason for not becoming a member of FAA is (a) not fully aware of the existence and role of the FAA and (b) skeptical of the success of the associations.

Table 4: Families distribution of farmers in Sungai Manik-LabuKubong irrigation area.

| No. of person | No. of sampled households | % sampled household |
|---|---|---|
| 1 | 1 | 3.33 |
| 2-3 | 2 | 6.67 |
| 4-5 | 2 | 6.67 |
| 6-7 | 11 | 36.67 |
| ≥8 | 14 | 46.67 |
| Total | 30 | 100 |

Integrated rice-fish farming system does not only involve culturing fish in ricefield but also diversifying the previous system with the same financial capital and operational cost to increase per square hectare. Basically, this system changes the operational cost from buying pesticides to buying fingerlings and equipments for fish culture. The system also reduces the dependency of rice fields on pesticides. Other studiesconducted in the same area had shown that the residual of herbicides and insecticides was analyzed and proved that none of the organphosphorous and carbamates pesticides exceeded the 0.5 mg/kg limit, and the fisheswere thus, safe for consumption (Yunus and Lim, 1971).

# 4 ANALYSIS (Problem, hopes, and aspiration of the farmers)

Most farmers in Sungai Manik and LabuKubong irrigation scheme faced problems of limited resources, low output prices, insufficient irrigation, pests, insufficient capital, and weedy rice or local name "padiangin" (early grain mature all dropped easily before harvest). Indeed, the most serious problem in this location is about the weedy rice. Some farmers have tried other technology such as water seeding to reduce weedy rice but, at the same time encounter other problem such as destruction of the germinating seed by the snail pest, *Pomaceae* spp. Farmers expressed great anxiety over reasons as to why their land was not as productive as it could be. Problem of water irrigation, insufficient flow of water for rice field, water discharge in Sungai Manik and LabuKubong not only caused problem of rate of water flow but also water management to the farmers.

Others problems include not adhering to the specific date set by the Government for land preparation, planting and other field practices in spite of publicity given to the timing of these field activities. Because of this non-uniformity, planting and harvesting had to be extended over 3 to 4 months instead of one month and for the main season farmers had to forego a crop so as to enable them to start on the scheduled planting dates. The non-uniformity of planting and harvesting makes it difficult for the Drainage and Irrigation Department to control the water supply in the rice fields. In some localities, the rice field must be flooded to enable transplanting but there may be some others farmers within the same area who are just beginning to prepare for seeding. Yields are considerably reduced if farmers do not follow the gazetteof planting dates.

Only a few farmers applied for credit from the "*Bank Pertanian*". Farmers Area Association (FAA) or Co-operatives could be the main reason for the small quantities of fertilizers, pesticides and others equipments that are needed and used by farmers. The new high yielding varieties, if they are to be fully exploited, require large quantities of fertilizers, pesticides, spraying equipments, and tractor service for plowing. In order to purchase these inputs and services, farmers need to be provided with timely credit. Farmers need to be made fully aware of the importance of fertilizers to produce maximum income through better extension service. Institutional credit through FAA has been established and comprehensively facilitates farmers in terms of the equipment requirement. During harvest period, farmers must sell the yield to FAA.

# 5 CONCLUSIONS

Farmers would use the extra profit to improve farm resources, such as purchasing extra rice field, buying more equipment and repairing the house. Farmers also spend their extra income for their children's and their own welfare. Thus, these farmers are not only trying to improve the present situation but also think of their future. Some farmers even use the extra income to perform the *Haj*. Currently, most of these farmers' children migrate to the big cities to look for job opportunities to change their fortune and livelihood. Most of these farmers only have school-going children living with them at home. Thus, this explains why there is a shortage of labor in the rice fields in the study area. Farmers were also asked the kind of infrastructure, improvement and repair that they require for their areas. Improving, repairing and accessing to irrigation were by far the most important not only to make it easier for the water to flow into rice fields but also to increase yield and to reduce operational cost by water pumping into the field. As weedy rice is the most serious problem in

the rice fields, most farmers hope assistance from appropriate agencies to solve this problem.

## 6 RECOMMENDATION

Farmers must consider cultural fishing in rice fields, especiallyabout the type of fish that contribute the highest amount of returns and are easily cultivated. Giving the fishes food with additional supplements of commercial food at the rate 3 to 4% of bodyweight is good for fishes as all the nutrients promote growth and to the rice fields as they act as additional fertilizers (inorganic and organic).Furthermore, farmers could also look into the methods and means to control the disappearance of fishes and loss due to predators. Preferably, future research could investigate the natural methods of preventing predators into rice fields.In addition, farmers also look into comparing the concurrent integrated rice-fish farming system with others farming systems, namely sequential and rotational systems, which have continuous flow of irrigation water throughout the year. This research could actually recommend the most ideal farming system that provides the highest income and profits to farmers.

## ACKNOWLEGMENTS

I wish to thank,Prof. Dr. JambariHj. Ali, Dr. MisriKusnan, and Dr. Hishamuddin Omar in our research's team for this programme, and to thank the School of Graduate Studies of Universiti Putra Malaysia for granting through the IRPA project No: 01-02-04-0040 EA 001 (Ministry of Science, Technology and Environment Malaysia) for financing our experiment.

## REFERENCES

Ali, A.B. 1987a. Yeilds obtained from the Kerian method of ricefield fish culture monitored for three consecutive growing seasons. Paper presented at the Asian Biology-International Foundation for Science Day Symposium, 14-17 October 1987, Kuala Lumpur, Malaysia.

Ali, A.B. 1987b. The Ecology of fish culture in ricefields: some ecological aspects of fish culture system of North Kerian. Paper presented at the Asian Biology-International Foundation for Science Day Symposium, 14-17 October 1987, Kuala Lumpur, Malaysia.

Ali, A.B. 1990. Some ecological aspects of fish populations in tropical ricefields.Hydrobiologia 190:215-222.

Ali, A.B., 1998. Rice ecosystem and the maintenance of biodiversity.*In* Rice Agroecosystem of the Muda Irrigation Scheme, Malaysia (eds.) N.B. Mat., N.K. Hoi., I. Said., A.B, Ali and K.Y.lum, MADA, Bangi, Selangor, pp 26-36.

Ali, B.A. 1992. Rice-fish farming development in Malaysia: past, present and future, p 69-76. *In* C. R. Dela Cruz., C. Lighfoot., B. A. Costa-Pierce., V. R. Carangal., and M. P. Bimbao(eds.) Rice-fish reseach and development in Asia. ICLRAM Conf. Proc. 24, 457 p.

Annual Fisheries Statistics.2003. PerangkaanTahunanPerikanan 2003 (jilid 1). Department of Fisheries Malaysia, Kuala Lumpur.

CheRohani, A., Mohammad, R., Wahid, M. A., Hussin, A. B., and Wan Ismail, W. R. 2002.Fishery Processing-Handbooks, manuals.MARDI, Serdang, Malaysia.

Kechik, I. A. 1995. Aquaculture in Malaysia, pp 125-135. *In* Bagarinao TU, Flores EEC (eds.) Towards sustainable aquaculture in southeast Asia and Japan. SEAFDEC Aquaculture Development, Iloilo, Philippines.

Moulton, T.P. 1973. The effects of various insecticides (especially Thiodan and BHC) on fish in the paddy fields of West Malaysia.Malays.Agric.J. 49:224-253.

Ruddle, K.A. 1982. Traditional integrated farming systems and rural development: the example of ricefield fisheries in southeast Asia. Agricultural Administration 10:1-11.

Sinniah, U. R., Wahyuni, S., Syahputra, B. S. A. and Gantait, S. (2012). A potential retardant for lodging resistance in direct seeded rice (*Oryza sativa* L.).*Canadian Journal of Plant Science*, Vol.92, No. 1, pages 13-19.

Song, M.K. 1947. Preliminary report on sepatsiam investigation in Krian. Offprint Special Communication Southeast Asia, Fish. Conf. Pap. No. 9, Singapore.

Song, M.K. 1948. Fishes of the Malayan paddy fields I :sepatsiam (*Trichogasterpectoralis* (Regan) ) . Malay. Nat. J. 3:87-89.

Song, M.K. 1949. Fishes of the Malayan paddy fields II: Aruan; serpenthead fishes .Malay. Nat. J. 4:29-31.

Song, M.K. 1950. Fishes of the Malayan paddy fields III: Keli; catfish. Malay. Nat. J. 5:88-91.

Song, M.K. 1951. The fitness of ecological niches into which fish are introduced at various ages and the survival of the transplanted fish.Proc. Indo-Pac. Fish.Counc. 3:218-227.

Song, M.K. 1955. Fish culture in paddy fields in the Federation of Malaya.FAO International Rice Commission Fourth Session, Tokyo, Japan, 1954 (mimeo) Indo-Pac. Fish.Counc.6th. Sess., IPFC/CSS/CP 265 p.

Syahputra, B.S.A., Sinniah, U.R., Rastan, S.S.O. and Ismail, M.R. (2013). Changes in Gibberellic Acid

($GA_3$) content in *Oryza sativa* due to Paclobutrazol treatment. *Journal of Food and Pharmaceutical Science*. Vol.1, No.! pages 14-17

Syahputra, B.S.A., Sinniah, U.R., Ismail, M.R. and Malappa, K.S. (2016).Optimization of paclobutrazol Concentration and Application Time for Increased Lodging Resistance and Yield in Field-growth Rice.*The Philippine Agriculture Science(PAS),* Vol. 9, No. 33.

Syahputra, B.S.A., 2016. Fish Culture in Rice Filed. Cetakan Pertama, Agustus 2016, UMSU PRESS.

Tan, E.S.P. 1971. The use of "pukatsepat" in the harvesting of "ikansepatsiam", (*Trichogasterpectoralis* (Regan) ) in the paddy-fields of northern Krian, Perak. Malay.Agrc.J. 48:69-72.

Tan, E.S.P. 1973. The significance of sump pond in harvesting paddy-fields fishes in north Krian , Perak. Malay.Nat. J. 26:26-31.

Tan, C.E., Chong, B. J., Sier, H. K., and Moulton, T. 1973. A report on paddy and paddy-fish production in Kerian, Perak. Min. Agric. Fish. , Bull. No. 128, Kuala Lumpur, Malaysia, 57 pp.

Yunus, A., and G.S. Lim. 1971. A problem in the use of insecticides in paddy fields in West Malaysia – a case study. Malay.Agrc. J. 48:167-178.