

Full Length Research Paper

Socio-personal characteristics on the adoption of rice-fish culture system in North of Iran

Seyyed Ali Noorhossaini Niyaki and Mohammad Sadegh Allahyari*

Department of Agricultural Management, College of Agriculture, Islamic Azad University, Rasht Branch, Rasht, Iran.

Accepted 20 October, 2019

Rice-fish culture system is not a purely technical decision and different factors may affect it. The identification of these factors can help in distinguishing adopters from non-adopters in an attempt to extend the rice-fish culture. This study sought to identify effective socio-personal characteristics on the adoption of rice-fish culture system by farmers in North of Iran. A survey was conducted using a stratified random sampling to collect data from farmers of selected rural in Western Guilan, Northern Iran. The questionnaire validity and reliability were also determined to enhance the dependability of the results. The subjects under study were then divided into two groups of adopters and non-adopters. A total of 61 adopters and 123 non-adopters were studied for effective characteristics. Results showed that effective socio-personal characteristics affecting an adoption of rice-fish culture in Western Guilan are family size, membership in social institutions, rate of participation in extension activities and number of extension contacts.

Key words: Adoption, rice-fish culture, socio-personal characteristics, farmers, North Iran.

INTRODUCTION

Rice and fish are fundamental components of farming systems and diets in many nations (Frei and Becker, 2005c; Saikia and Das, 2008; Ofori et al., 2005) including Iran. Currently some 80 million ha (around 55%) of the world rice area are under irrigation. Irrigated rice areas with appropriate infrastructure can potentially be used for concurrent fish production (Frei and Becker, 2005a). Rice-based fish farming is the main source of earning in many parts of the world (Saikia and Das, 2008). Rice-fish culture (RFC) under either capture systems or culture systems is a low-cost sustainable practice to obtain high value protein food and minerals (Saikia and Das, 2008; Frei and Becker, 2005c). At the farm level rice-fish integration reduces use of fertilizers (Salehi and Momeni, 2006; Frei and Becker, 2005c; Frei and Becker, 2005b; Cheng-fang et al., 2008; Yong et al., 2006; Saikia and Das, 2008), pesticides and herbicides (Salehi and Momeni, 2006; Frei and Becker, 2005c; Kathiresan, 2007; Saikia and Das, 2008) in the field. Such reduction of costs lowers farmer's economic load and increases their additional income from fish sale (Saikia and Das, 2008) and higher rice yields (Frei and Becker, 2005c; Das et al., 2002; Yong

et al., 2006; Saikia and Das, 2008). With such savings and additional income, the net productivity from RFC is reported to be higher than rice monoculture (Saikia and Das, 2008). This type of integrated production can optimize resource use through the complementary utilization of land and irrigation water. Moreover, it has the benefit of supplying rice as a source of carbohydrates and fish as a source of high quality protein. This aspect may be particularly relevant in rural areas of less developed countries in the tropics (Frei and Becker, 2005c).

RFC activities have been reported from China, Egypt, India, Indonesia, Thailand, Vietnam, the Philippines, Bangladesh, Malaysia, Cambodia, Republic of Korea, Madagascar and other countries (Saikia and Das, 2008; Frei and Becker, 2005c). Reliable data on production quantities and ratios are difficult to obtain as these are seldom taken up in national statistics. However, it is known that the adoption of RFC remains rather marginal to date (Frei and Becker, 2005c). Fish farming in rice field of North Iran is low cost activity due to potential equipment. Technical support of this equipment will lead to noticeable production of fish associated with rice (Karami et al., 2006). Unfortunately, more efforts of extension and experts of agricultural organization could not increase RFC adoption among local farmers. Study of

*Corresponding author. E-mail: Allahyari@iaurasht.ac.ir.

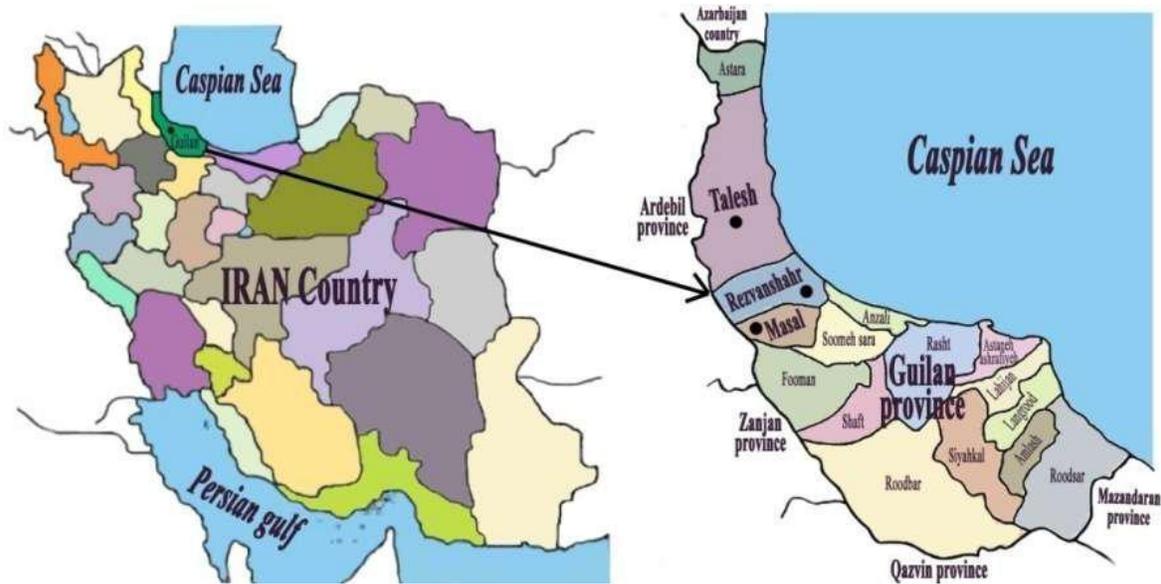


Figure 1. Site of study.

various effective factors on adoption of this technology will provide extension and development fisheries significantly.

The most important variables, which differentiated RFC adopters and non-adopters in Fars province of Iran, were access to information, knowledge of fish fingerlings, aquaculture management and plot preparation for aquaculture and knowledge of fish harvesting (Karami et al., 2006). Sex, age, wetland size and livestock ownership were important parameters for adoption of fish farming among farmers in Malawi (Kapanda et al., 2005). Sex, age, formal education, religious beliefs, extension education, land size, income, family size, risk and profitability were important for the adoption of fish farming technology in Tanzania (Wetenger, 2009). Age, extension education, profitability, marketability, risk, palatability and easiness to obtain farmed fish were significant in explaining the intensification of fish farming technology in Morogoro and Dar es Salaam Regions, Tanzania (Wetenger, 2010a). Farmers adopted fish farming in order to obtain fish for domestic consumption and for sale. However, while most women gave more priority to fish as food, more men gave priority to fish as a cash crop. Farmers who realized their objectives continued and intensified fish farming technology. Conversely, those who did not realize their objectives abandoned or practiced low level technology. Farmer's objectives were not realized due to poor production technology, harvest strategy and the nature of the product. Accordingly, non-adopters were reluctant to adopt fish farming because the technology did not have significant impact on the adopter's well-being in eastern Tanzania (Wetenger, 2010b). Access to resources is a key factor that determines the adoption of a recommended package of a technology and farmers allocate resources to activities,

which contribute to household food and income security in eastern Tanzania (Wetenger, 2010c). This study presents a single case study on effective socio-personal factors of RFC adoption in Guilan Province of North Iran due to potential of fisheries and suitable water resources in this region.

MATERIALS AND METHODS

This study was carried out by survey during July and August 2009. The study area includes Talesh, Rezvanshahr and Masal set in Tavalesh region of Guilan Province near the Caspian Sea (Figure 1). Respondents from selected rural areas were categorized into adopters and non-adopters of rice-fish culture. A total of 184 farmers including 61 adopters and 123 non-adopters were randomly selected to answer the questionnaire (Table 1). The questionnaire was pre-tested by interviewing three farmers (not included in the study). After some modifications, it was tested again with 10 other respondents.

The dependent variable was the adoption rice-fish culture among farmers of Tavalesh region of Guilan Province. Frequency, percent and standard deviation were used for the statistical analysis of qualitative data. Chi-square test, t-test, and Mann-Whitney test were used for data analysis, using SPSS ver. 16 software.

RESULTS AND DISCUSSION

Age

The frequency distribution showed that more respondents in the age category were 51 years and older (38.6%) and the lowest frequency in age was category 20 to 30 years (Table 2). In this study, results showed that there was no significant relation between adoption and age variable (Table 3) and no significant difference between the two groups of adopters and non-adopters of RFC according to the mean age (Table 4). Age was not an important

Table 1. Total sample size used in the study area.

	Talesh	Masal	Rezvanshahr	Total
RFC Adopters Population	31	31	17	79
RFC Adopters Sample Size	19	28	14	61
RFC Non-adopters Sample Size	38	56	29	123

Source: Survey results, 2009.

Table 2. Frequency, mean and standard deviation of socio-personal characteristics of farmers.

Characteristics	Groups	Frequency	Percent	Cumulative percent	Mean	Std. deviation
Age	20-30 years	27	14.7	14.7	45.97	1.25
	31-40 years	45	24.5	39.1		
	41-50 years	41	22.3	61.4		
	51 year through highest	71	38.6	100		
Sex	Male	175	95.1	-	-	-
	Female	9	4.9	-	-	-
Education level	Illiterate	35	19	19	-	-
	Primary school	48	26.1	45.1		
	Guidance school	41	22.3	67.4		
	High school/Diploma	48	26.1	93.5		
	College degree or highest	12	6.5	100		
Marital status	Married	178	96.7	-	-	-
	Single	6	3.3	-	-	-
Family size	1-3 person	35	19	19	5.18	2.08
	4-6 person	107	58.2	77.2		
	7 person through highest	42	22.8	100		
Membership in social institutions	0 institution	33	17.9	17.9	2.07	0.67
	1 institution	108	58.7	76.6		
	2 institution	40	21.7	98.4		
	3 institution	3	1.6	100.0		
Rate of participation in extension activities*	Very little	121	65.8	65.8	1.65	1.06
	little	27	14.7	80.4		
	Intermediate	17	9.2	89.7		
	Much	16	8.7	98.4		
	Very mach	3	1.6	100		
Number of extension contacts during year	Lowest through 5	124	67.4	67.4	17.09	48.73
	6-20	21	11.4	78.8		
	21-35	9	4.9	83.7		
	36-50	21	11.4	95.1		
	51 through highest	9	4.9	100.0		
Experience in rice culture (year)	Lowest through 15	22	12.0	12.0	33.09	13.56
	16-25	44	23.9	35.9		
	26-35	36	19.6	55.4		
	36-45	48	26.1	81.5		

Table 2. Contd.

	46 through highest	34	18.5	100.0		
Experience in RFC (year)	1-3	41	22.3	22.3	3.61	3.11
	3-5	10	5.4	27.7		
	5-7	5	2.7	30.4		
	7 through Highest	5	2.7	33.1		
	Non adopters	123	66.9	100		

Table 3. The effect of socio-personal characteristics on RFC adoption using Chi-square test.

Characteristics	X ²	P
Age	0.729 ^{ns}	0.866
sex	0.544 ^{ns}	0.461
Education level	7.154 ^{ns}	0.128
Marriage status	0.000 ^{ns}	0.992
family size	6.790*	0.034
Membership in social institutions	8.170*	0.043
Rate of participation in extension activities	21.499**	0.000
Number of extension contacts during a year	61.853**	0.000
Experience in rice culture	2.839 ^{ns}	0.585

^{ns} Non significant, * significant at P < 0.05 and ** significant at P < 0.01.

Table 4. Comparison of some Personal-Socio Characteristics of adopter and non adopter of RFC using t-test.

Characteristics	Groups	N	Mean	std. deviation	t	P
Age	Adopter	61	44.96	12.82	0.762 ^{ns}	0.447
	Non-adopter	123	44.47	12.50		
family size	Adopter	61	5.80	2.40	2.890**	0.004
	Non-adopter	123	4.87	1.84		
Membership in social institutions	Adopter	61	1.93	0.72	1.934 ^{ns}	0.055
	Non-adopter	123	2.13	0.64		
Number of Visit go with extension operative during a year	Adopter	61	35.83	67.96	3.807**	0.000
	Non-adopter	123	7.79	32.06		
Experience in rice culture	Adopter	61	33.34	14.45	0.173 ^{ns}	0.863
	Non-adopter	123	32.97	13.15		

^{ns} Non significant * significant at p < 0.05 and ** significant at p < 0.01.

parameter for invention adoption (Adeogun et al., 2008). Moreover, the results of other studies showed that there was no significant relation between invention adoption and age variable (Saka et al., 2005). Notwithstanding, other studies yielded that age was an important parameter for the adoption of fish farming in Tanzania, Malawi, as well as the adoption of other invention even in Iran (Kapanda et al., 2005; Wetenger, 2009; Astaneh and Iravani, 2007). Also was significant in explaining the intensification of fish farming technology in Tanzania, Malawi and adoption other inventions even in Iran

(Wetenger, 2010a; Tabaraee and Hassannejad, 2009; Faraji and Mirdamadi, 2006).

Sex

The frequency distribution showed that respondents were 95.1% of male and 4.9% woman (Table 2). In this study, the results showed that there was no significant relation between adoption of RFC and sex variable (Table 3) In addition, Saka et al. (2005) showed that there was no

Table 5. Comparison of some Personal-Socio Characteristics of adopters and non adopters of RFC using Mann-Whitney test.

Characteristics	Z	P
Education level	1.322 ^{ns}	0.186
Rate of participation in educational – extensional activities	3.337 ^{**}	0.001

^{ns} Non significant *significant at $p < 0.05$ and **significant at $p < 0.01$.

significant relation between adoption and sex. But sex was important parameters for adoption of fish farming in Malawi and Tanzania (Kapanda et al., 2005; Wetenger, 2009). Since one of the results of this study is that most respondents are male, we can contend that the sex variable is an important factor for the adopters of RFC. As men, have most interventions and consequently more role in the studied area. Most extension meetings patronized by men and women do not have access to the required knowledge for fish farming.

Education level

The frequency distribution showed that 19% of the respondents were illiterate, 26.1% primary-school level, 22.3% guidance level, 26.1% have a secondary Education and school diploma and 6.5% have college degrees or higher (Table 2). In this study, results showed that there was no significant relation between adoption and education level variable (Table 3) and no significant difference between the two groups of adopters and non-adopters of RFC regarding the education level variable (Table 5). Furthermore, no significant difference was found between the two groups of adopters and non-adopters of RFC in Fars Province, Iran with regards to the aforementioned variable (Karami et al., 2006). But there was significant relation between adoption of other invention and education level variable (Saka et al., 2005; Iravani et al., 2006; Rostami et al., 2008; Joshi and Pandey, 2005; Faraji and Mirdamadi, 2006; Darvish et al., 2009; Pezeshkirad et al., 2006; Lashgarara and Asadi, 2008; Kohansal et al., 2009).

Marital status

The frequency distribution showed that 96.7% of respondents were married and only 3.3% were single (Table 2). No significant relation between adoption and marriage status variable (Table 3).

Family size

The frequency distribution showed that in terms of family size, about 80% of respondents were more than four people (Table 2). In this study, results showed that there was a significant relation between adoption and Family

size variable (Table 3) and a significant difference between the two groups of adopters and non-adopters of RFC regarding family size (Table 4). Also, the results of a study by Wetenger (2009) showed that Family size was an important parameter for the adoption of fish farming technology in Tanzania, but was not considered to be important in the adoption of fish farming in Malawi (Kapanda et al., 2005). Similarly, Karami et al. (2006) did not report any significant differences, in terms of Family size variable between the two groups of adopters and non adopters of RFC in Fars Province, Iran.

Membership in social institutions

In this study, results showed that there was significant relation between adoption and membership in social institutions variable (Table 3) and no significant difference according mean membership in social institutions between the group adopters and non adopters of RFC (Table 4) was found.

Rate of participation in extension education activities

The frequency distribution showed that about 80% of respondents have participated in very little level and little in extension activities (Table 2). In this study, results showed that there was a significant relation between adoption and rate of participation in extension activities variable (Table 3) and a significant difference between the two groups of adopters and non-adopters of RFC as regards the rate of participation in extension activities variable (Table 5). In addition, studies by other researchers showed that the extension education was an important parameter for the adoption of fish farming technology (Wetenger, 2009, Boahene et al., 1999; Faraji and Mirdamadi, 2006; Lashgarara and Asadi, 2008; Mahboubi et al., 2005). Extension education variable was significant in explaining the intensification of fish farming technology in Tanzania (Wetenger, 2010a).

Numbers of extension contacts during a year

In this study, results showed that there were significant relation between adoption and Numbers of Visit with extension operative during a year variable (Table 3) and a significant difference according mean Numbers of Visit

go with extension operative during a year between the group adopters and non adopters of RFC (Table 4). Also results other researchers showed that there was significant relation between invention adoption and visit with extension operative (Adeogun et al., 2008; Saka et al., 2005; Joshi and Pandey, 2005; Boahene et al., 1999; Faraji and Mirdamadi, 2006; Darvish et al., 2009; Iravani et al., 2006; Rezvanfar and Mandape, 2000).

Experience in rice culture

According to the results, there was no significant relation between adoption and experience in rice culture (Table 3) and no significant difference between the two groups of adopters and non-adopters of RFC regarding the mean Experience in rice culture (Table 4). Nevertheless, the results of other experiments showed that there was a significant relation between the adoption of other inventions and activity experience in agriculture in other parts of Iran (Tabaraee and Hassannejad, 2009; Pezeshkirad and Arayesh, 2001).

CONCLUSIONS AND RECOMMENDATION

The findings from this study have significant implications on fish farming development in Talesh, Iran. According to the results of this study, the main important factors on adoption of RFC were family size, membership in social institutions, rate of participation in extension activities and number of extension contacts. Based on the results, it can be concluded that it is necessary to promote training for farmers with high potential in various aspects of fish farming that can increase the tendency to the technology. Second, fisheries experts and extension agents with regard to the economic characteristics and conditions of the farm must be take note to socio-personal characteristics of farmers. Since women were less likely to adopt fish farming, deliberate effort should be made to reach out to these women as away of empowering them.

REFERENCES

- Adeogun OA, Ajana AM, Ayinla OA, Yarhere MT, Adeogun MO (2008). Application of logit model in adoption decision: A study of hybrid clarias Lagos state, Nigeria. *Amer Eurasian J. Agric. Environ. Sci.*, 4(4): 468-472.
- Boahene K, Snijders TAB, Folmer H (1999). An integrated socioeconomic analysis of innovation: The case of hybrid cocoa in Ghana. *J. Pol. Modeling*, 21(2): 167-184.
- Cheng-fang L, Cou-gui C, Jin-ping W, Ming Z, Wei-ling Y, Ahmad S (2008). Nitrogen losses from integrated rice-duck and rice-fish ecosystems in southern China. *Plant Soil*, 307: 207-217.
- Astaneh DAR, Iravani H (2007). Factors affecting adoption of wheat insurance in Iran: A case study of Tehran province. *Roosta Va Towse'*, 10(2):109-135.
- Darvish AK, Chizari M, Mirdamadi SM (2009). Analysis of socio-economic factors influencing on adoption of agroforestry among poplar farmers in northern part of Iran. *Iranian J. Forest. Poplar Res.* 16(3): 486-494.
- Das DR, Quddus MA, Khan AH, Nur-e-Elahi M (2002). Farmers' participatory productivity evaluation of integrated rice and fish systems in transplanted Aman rice. *Pakistan J. Agron.*, 1(2-3): 105-106.
- Faraji E, Mirdamadi SM (2006). Assessing the role of extension in adoption of the insurance by apple producers in the Damavand area. *J. Agric. Sci.*, 12(3): 489-500.
- Frei M, Becker K (2005a). Integrated rice-fish production and methane emission under greenhouse conditions. *Agric. Ecosyst. Environ.*, 107: 51-56.
- Frei M, Becker K (2005b). A greenhouse experiment on growth and yield effects in integrated rice-fish culture. *Aquaculture*, 244: 119-128.
- Frei M, Becker K (2005c). Integrated rice-fish culture: Coupled production saves resources. *Nat. Resour. Res.*, 29: 135-143.
- Iravani H, Kalantari Kh, Mohammadi SHM, Vahedi M (2006). Influential factors in adoption of wheat crop insurance in Tafresh County. *Iranian J. Agric. Sci.*, 37(1): 137-144
- Joshi G, Pandey S (2005). Effects of farmers' perception on the adoption of modern rice varieties in Nepal. Conference on International Agricultural Research for Development. Stuttgart-Hohenheim, 11-13 October 2005.
- Kapanda K, Matiya G, N'gong'ola DH, Jamu D, Kaunda Ek (2005). A logit analysis of factors affecting adoption of fish farming in Malawi: a case study of Mchinji Rural Development Program. *J. Appl. Sci.*, 5(8): 1514-1517.
- Kohansal MR, Ghorbani M, Rafiei H (2009). Study of effective environmental and non-environmental factors in adoption sprinkler irrigation methods: Case study of Khorasan Razavi province. *Q. J. Agric. Econ. Stud.*, 17: 97-112.
- Karami EA, Rezaei MK, Ahmadvand M, Lari MB (2006). Adoption of rice- fish farming (RFF) in Fars province. *Iranian J. Agric. Ext. Edu.*, 2(2): 31-43.
- Kathiresan RM (2007). Integration of elements of a farming system for sustainable weed and pest management in the tropics. *Crop Prot.*, 26: 424-429.
- Lashgarara F, Asadi A (2008). An analysis of factors influencing lorestan province's farmers' adoption of sustainable agriculture (Agricultural Economics and Development). *Iranian J. Agric. Sci.*, 39-2(1): 97-104.
- Mahboubi MR, Iravani H, Rezvanfar A, Kalantari Kh, Mohseni SM (2005). Factors affecting the adoption behaviour regarding soil conservation technologies in the Zarrin Gol, watershed in Golestan province. *Iranian J. Nat. Res.*, 57(4): 595-606
- Ofori J, Abban EK, Otoo E, Wakatsuki T (2005). Rice-fish culture: An option for smallholder Sawah rice farmers of the West African lowlands. *Ecol. Eng.*, 24: 235-241.
- Rezvanfar A, Mandape MK (2000). Adoption behaviour of livestock owners in east Azarbaijan province of Iran. *Q. J. Agric. Econ. Stud.*, 82(30): 201-218.
- Pezeshkirad GR, Arayesh MB (2001). An examination of economic and technical factors influencing adoption of sprinkler irrigation technology in Ilam province. *Agric. Sci. Tech.*, 15(2): 111-118.
- Pezeshkirad GR, Masaali M, Yaghoubi J (2006). A study of the effective factors involved in adoption of integrated pest management of rice stem borer (*chilo suppressalis*), isfahan, iran. *Iranian J. Agric. Sci.*, pp. 27-33.
- Rostami F, Shaaban AFH, Movahed MH, Iravani H (2008). Factors affecting on the adoption toward insurance (case study: Harsin county in Kermanshah province). *Q. J. Agric. Econ. Stud.*, 15(4): 1-21
- Saikia SK, Das DN (2008). Rice-fish culture and its potential in rural development: A lesson from Apatani farmers, Arunachal Pradesh, India. *J. Agric. Rural Dev.*, 6(1&2): 125-131.
- Saka JO, Okoruwa VO, Lawal BO, Ajijola S (2005). Adoption of improved rice varieties among small-holder farmers in south-western Nigeri. *World J. Agric. Sci.*, 1(1): 42-49.
- Salehi H, Momen nia M (2006). The benefits of fish and rice integrated culture in Iran. *Iranian J. Fish. Sci.*, 15(3): 97-108.
- Tabaraee M, Hassannejad M (2009). Cess of agricultural development Case study: Wheat farmers in Mashhad. *J. Econ. Agric. Dev.*, 23(1): 59-68.
- Wetengere K (2009). Socio-economic factors critical for adoption of fish farming technology: The case of selected villages in Eastern

Tanzania. *Int. J. Fish. Aqua.*, 1(3): 028-037.

Wetengere K (2010a). Socio-economic factors critical for intensification of fish farming technology. A case of selected villages in Morogoro and Dar es Salaam regions, Tanzania. *Aquacult Int.*, in press.

Wetengere K (2010b). Realizing Farmer's Objective - Vital to Adoption Process of Fish Farming Technology. The Case of Selected Villages in Eastern Tanzania. *Adv. J. Food Sci. Technol.*, 2(2): 116-124.

Wetengere K (2010c). Determinants of Adoption of a Recommended Package of Fish Farming Technology: The Case of Selected Villages in Eastern Tanzania. *Advance J. Food Sci. Technol.*, 2(1): 55-62.

Yong Y, Hong-cheng Z, Xiao-jun H, Qi-gen D, Yang-jiang Z (2006). Characteristics of growth and yield formation of rice in rice-fish farming system. *Agric. Sci. China.* 5(2): 103-110.