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The consequences of Rice Technology on Rural Women: The Case of Iran

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ABSTRACT

Determinants of adoption of new technology among rice producers in Mazandaran provinces and study of the impact of these technologies on women are the main objectives of this paper. Diffusion of rice technology in rural areas has different consequences. Reduction of women involvement in rice production is one of the possible consequences of adoption of new rice technologies. A two stages cluster sampling technique was used to collect data for this study. Forty villages were randomly selected. Three hundred female family labor and 220 female-hired labor were randomly selected at the second stage of sampling for interview. Findings showed a positive correlation between technology adoption and amount of female family labor activities in seed disinfection and seed selection. There was a negative correlation between technology adoption and female family labor activities in transplanting stage. Female hired labor activities in transplanting had a negative correlation with technology adoption. Mechanical technology adoption reduced women activities in transplanting and harvesting stage and, as a result, decreased women's income. Finally recommendations in relation to adoption and consequences of technologies are introduced.

Keywords: *Rice, Rural Women, Iran.*

INTRODUCTION

Rice is the most important staple food crop for more than half of the world`s population. World rice production therefore needs to increasing, while land, water and labor are all decreasing. Rice is grown on flooded land and on dry land, in tropical rain forests of Africa and in arid deserts of the Middle East, on coastal plains and on the Himalayan mountains. In the year 2010, the world produced about 603 million tones of paddy rice. Most of that - about 583 million tones- was grown in Asia. Ninety percent of the world crop is grown and consumed in Asia. Rice provides 27% of people's energy intake and 20% of their dietary protein (Feizabadi, 2011).

Nowadays, rice planting has become an integral part of millions of people's lives all over the world. At the present time, 90% of the world's rice is produced in China, India, Japan, Korea, and Southeast Asia. According to the latest statistics from FAO in 2005 the area of rice planted lands around the world was about 151 million hectares. India and China with 74 million hectares have allocated about 50% of the world's rice planting to themselves. This product provides more than a half of food materials for people living in hot and semi-hot places. It also provides more than 80% of calories and 75% of protein for people living in Asia. Together with India, Korea, China, Taiwan, and, Thailand, Iran is one of the main producers of this crop in Asia. Average annual consumption of rice in the world amounts to 80-90 kilograms per year, while this amount in Iran is 25-45 kilograms per year. Considered as a main source for supplying food, this crop stands in second place after wheat in Iran. Iran's total rice production stands at 2.7 million tons per annum whereas annual consumption is about three million tons. And, because of the increase in the size of population and rapid growth in annual consumption, limitations of acreages on which rice could be planted, Iran's geographical position in a semi-desert region and non-mechanized farms, imports of rice has increased considerably in comparison with the last years. Because of the restricted size of the lands and lack of other

revenue sources for farmers, admission of new varieties and agricultural technologies takes place at a very low level (Peykani, 2009).

Mazandaran province, which is located in the north of Iran and close to the sea, has the largest production of rice in Iran (1380622 tons in 2010; About 46.3% of total production) because of kind of its climate. Especially, the growth of rice production in this province during the last two decades has been considerable in parallel to the population growth. In addition to the increase of population, some factors accompanying with that such as the increase of the income level and purchase ability, the change of the consumption pattern of the families toward rice consumption and the development of technology have caused the industrial rice production to open the place in the economy of Iran, so that rice has became the second largest staple food crop in Iran. Moreover, high-yield variety technology has improved farmers with high yield, saved land for agricultural diversification and created rural improvement opportunities (Feizabadi, 2011).

Throughout the world, rural women historically have played and continue to play an important role in rice production. Women's involvement in rice production varies from region to region, and even within regions. The percentage of labor supplied by women in rice cultivation varies from 3% for floating rice cultivation (using animal traction) in Mali, to 80-100% in mangrove swamp rice cultivation in the Gambia and Liberia. In the latter case, women participate in most of the operations and usually undertake post harvest processing of the crop. This production work is of course, in addition to their traditional gender roles as home managers and community organizers (Fonjong, 2007).

In north of Iran, women participated in many agricultural activities such as land preparation, seed treatment, sowing of seed, fertilizer application and seedling plantation of paddy. Farm women participated in agriculture productions activates, such as cultivating (seeding) conservation (weeding, spading and sifting) and harvest (cut sugarcane branches) and they also participate in activities like doing pastoralist and caring animals, milking, nurturing poultry, gardening, fixing yard, snow removal, repairing building, handicrafts. Preparing seed for transferring to storage were done by women. Transplanting (most important stage in cultivating rice) and weeding were done by them, completely. Although no land was considered for women (indeed by this, major proportions of agriculture workforces was deprived from having production instruments that they work on) but, it has affected on women’s roles in agriculture activity (Naseri, 2013).

As a result, women’s key role in achieving food security through food crop production and selection has often been bypassed. Neglecting women as agricultural producers and resource managers hinders the attainment of food security goals. Thus, to improve and support sustainable agricultural production in developing countries, it is important to place food crops and animals that are usually grown or raised by women high on the research agenda. While it is often argued that agricultural technologies are gender-neutral, it is important to note that they are not resource-neutral, implying socioeconomic considerations in technology generation and transfer. To be viable, technology has to be ecologically sound and socially just; in other words, it should be responsive to different interests, needs, resources, involvement, outlook, and socio-cultural circumstances. Hence, it is necessary that scientists, planners, administrators, extension workers, and development workers be sensitive to these issues. It is not only that farm women engage themselves in a variety of activities; they also contribute to the family income through their wage earnings, which form a major part of the incomes of poor households. Despite their contributions to agriculture, they have long been taken for granted, been ignored, and remain "invisible farmers"(Tara Satyavathi, 2010).

Technological change in rice cultivation is a necessary condition to improve the standard of living of rice farmers with their families, especially the poor ones. The rice technologies, consists of two groups. First, mechanical technologies such as: transplanting machine, combine and tailer, and non mechanical technologies such as herbicide, and so on. These two groups have different impacts on women activity. The technologies that need more activities, have positive impact on women's income and activity. On the country, the labor saving technologies decrease the amount of female-hired labor activity and their income. In sum, the female-hired labor will profit from these technologies if they increase employment opportunities, productivity of labor and land and access to information about these new technologies (Unnevehr and Stanford,1985).

Changes have raised to increase rice productivity in Iran in recent three decades such as improvement of water management, using tailor and tractor, introducing new varieties, chemical fertilizers and herbicides, non chemical procedures and second cultivation in rice lands. The impact of these activities among women's rice-producer depends to their providing and planning. A technology with correct planning has positive impact on women's rice-producer and vice versa. Introducing new varieties of rice has increased employment of women (Barker et al, 1985; Agarwal, 1985).

The extension of second cultivation of rice has increased productivity of production factors, the activity and income of women's rice-producer (Dey,1984).The labor-saving technologies such as transplanting machine and combine have decreased the difficulty of women labor by realization of women and increasing their labor (Kada and Kada,1985).

RESULTS AND DISCUSSION

Findings and Discussion

Adoption of technology in rice producing households

There is a significant relationships between technology adoption and "the amount of rice producing households in village", "educational level of women", "educational level of men", "education of males and females in households", "yield of rice", "agricultural loans obtained", "attending in training classes", "contact with extension agent", "listening to radio programs" and "participation in decision-making"(table1).

The relationships between technology adoption and educational of women(r=0.3)and educational of men(r=0.4) are significant and positive at 0.001 level. These findings lend support with the findings of voh(1982) in nigerieh, Karami (1983)in Iran, Igdon and Ekpere (1988) in nigerieh, Alamgir hossein and crouch(1992) in Bangladesh and Hossein et al.(1994) in Pakistan. There are positive and significant relationships between level of education of female and male in households (0.4and 0.3 respectively) and technology adoption at 0.001 level. These findings are comparable with the findings of Karami(1983) in Fars province of Iran and Abd-Ella et al(1981) in USA.

There is a positive and significant correlation between technology adoption and yield of rice at 0.001 level. This finding lends support to Karami(1983) in Fars province of Iran, Igdon and Ekpere(1988) in Nigerieh,Abilay et al(1984) and Bhatti et al(1986) in Pakistan, Yadava and Gangwar(1986) in India and Pingali(1992) in Phillipine.

There are positive and significant correlations between technology adoption and the number of agricultural loans obtained(r=0.4) and the amount of agricultural loans obtained(r=0.5) at 0.001 level. These are comparable with the findings of Karami(1983) in Fars Province of Iran, Sereenivasulu et al(1988) and Kerketta(1992) in India.

The relationships between technology adoption and the number of training classes which household women attend(r=0.6) and number of contacts with agricultural extension agents(r=0.6) are positive and significant.These findings indicate that, how much higher contacts and training classes, there is higher rate of technology adoption. These are comparable with the findings of Abd-Ella et al(1981) in Nigerieh, Kerketta(1992) in India and Hossein et al(1994)in Pakistan, also the relationship between technology adoption and listening to agricultural radio program and participation rate of household women in decision making are significant(Table1).

Table1. correlations between technology adoption and independent variables

Independent variables	Correlation Coefficient
Number of households in village	0.14
Rice producing households in village	0.34**
Age of women	-0.1
Number of family members	-0.1
Education level of women	0.3**
Education level of men	0.4**
Education level of male in household	0.3**
Education level of female in household	0.4**
Land area of rice cultivation	-0.04
Total land of family	0.1
Yield of rice	0.3**
Number of years in rice cultivation	0.1
Income from rice cultivation	0.1
Number of loans obtained	0.4**
Amount of loans obtained	0.5**
Number of training classes	0.6**
Number of contacts with agents	0.6**
Listening to radio programs	0.6**
Participation in decision making	0.7**

**significant at 0.001 level

Technology adoption and rice-producing women activity

It was used correlation coefficient to identify relationships between technologies adoption in rice cultivation and the activities of women's rice-producing (Table2). The amount of activities of women's rice-producing in seed disinfection, seed selection had positive and significant relationships with technology adoption. On the contrary, the use of transplanting machine had negative impact on their activities. We see that transplanting had negative relationship with the activity of women (-0.3). The women have not any activities in land preparing, treasury providing, fertilizer, sprier. weeding and threshing(Table2).

Table 2. Relationships between technologies adoption of rice cultivation and the activities of women

The stages of rice cultivation	Correlation coefficients with female-family labor activity	Correlation coefficients with female-hired labor activity
1.Land preparing	-0.1	0
2.Seed disinfection	0.3**	0.03
3.Seed selection	0.35**	0.001
4.Wetting of seeds	-0.02	0.02
5.Providing of treasury	0.13	0
6.Transplanting	-0.3*	-0.03*
7.Fertilizer to farm	0.2	0
8.Sprier	0.003	0
9.Weeding	0.11	0
10.Harvesting	0.10	0.1
11.Threshing	-0.05	0

*significant at 0.01 level
**significant at 0.001 level

The consequences of technologies on women labor

The using of transplanting machines decreased the activity of women in the transplanting stage. The T-test was used to compare the activities of women (female-family labor and female-hired labor) in two type of farms (transplanting with machine and by hand). The findings were provided in table 3, 4. There is a significant difference between two groups in two types at 0.001 level. As we see in these tables, the women's activities in transplanting by hand are higher than transplanting by machine.

Table 3. The comparison of the activities of female-family in mechanical and traditional transplanting

Type of transplanting	Mean of women's activity	T
Transplanting by hand	2.36	7.46**
Transplanting by machine	0.12	

**significant at 0.001 level

Table 4. The comparison of the activities of female-hired in mechanical and traditional transplanting

Type of transplanting	Mean of women's activity	T
by hand	9.2	9.09**
by machine	0.11	

**significant at 0.001 level

The use of combine is substituted with the men and women labor in harvesting stage. The T-test was used to compare the activity of two groups of women (harvesting with the use of combine and traditional harvesting by hand) (Tables5, 6). As we see the use of combine has decreased the activity of women in this stage. The difference of two group in significant at 0.001 level.

Table 5. The comparison of the activities of female-family in mechanical and traditional harvesting

stage	Mean of women's activity mechanical harvesting	Mean of women's activity in traditional harvesting	T
Harvesting	0.035	1.06	7.02**

**significant at 0.001 level

Table 6. The comparison of the activities of female-hired in mechanical and traditional harvesting

stage	Mean of women's activity mechanical harvesting	Mean of women's activity in traditional harvesting	T
Harvesting	0.17	1.11	3.69**

**significant at 0.001 level

CONCLUSIONS

Conclusion and Recommendation:

Technological change and its impact on traditional under-developed societies which began modernization , has been of intense discussion in the last three decades. Diffusion of rice technology in rural areas has different consequences. Reduction of women involvement in rice production is one of the possible consequences of adoption of new rice technologies. Findings of this study showed a positive correlation between technology adoption and amount of female family labor activities in seed disinfection and seed selection. There was a negative correlation between technology adoption and female-family labor activities in transplanting stage. Female-hired labor activities in transplanting had a negative correlation with technology adoption. Mechanical technology adoption reduced women activities in transplanting and harvesting stages and, as a result. decreased women's income.

Recommendations in relation to technology adoption of rice-producing households are follows:

-Providing extension training in the use of new technologies to rice producing men and women.
-To provide TV and radio programs in relation to mechanical cultivation of rice.
-To provide loans and facilities for adoption of new technologies.

-To prepare especial training about new technologies to women's rice-producer.
-Due to role of women in family and rice cultivation decision making, it is necessary to provide comprehensive information about rice technologies. Following recommendation are provided in relation to consequences of technologies on women:
-Establishment of women cooperatives is the major recommendation for women employment. To providing facilities and loans to these cooperatives is of great importance for self-employment.
-It is necessary for research to prepare rice –technologies which have less negative impacts on rice-producing women.
-Extending of rural industries in villages to employment of female-hired labor.
-Establishment of package and processing industries in villages to absorb part of female-hired labor.

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