

Social Cost of Improper Land and Variety Selection in Paddy Production in Turkey

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Abstract

For last decades, efficient use of land as a natural resources has the priority at the agenda of policy makers. Allocating farm land to optimal crop and selecting proper crop variety is vital to reach not only economically, but also environmentally efficient farming. Therefore, the study examined the social cost of improper land and crop variety selection in paddy production in Samsun province of Turkey. Research data were collected from both field experiment and 45 paddy producers by using questionnaire. Classical economic analysis procedures and cost calculation methods were followed. Economic losses sourced from improper land allocation and wrong variety selection in paddy production was calculated by combining individual and social losses. Research results showed that average paddy producers conducted their activities in S2 class lost 1983 kg per hectare of paddy, which was valued \$595, due to improper land and variety selection. 64% of it was sourced from improper land selection, while that of improper paddy variety selection was 36%. However, average paddy producers conducted their activities in S3 class lost 3012 kg of paddy per hectare, which was valued \$900. Research results also showed that social cost of improper land and variety selection in Samsun was \$2,1 million. 62% of total social cost sourced from S2 class land, while that of S3 and S1 were 23% and 15%, respectively. 24% of the total social cost resulted from opportunity cost, while the rest attributed to improper land and variety selection in paddy production. Completing preparing activities the detail land use map and sharing with farmers in the research area may decrease the social cost of improper land and variety selection. Designing education program for farmers in order to make better variety and land selection and disseminate the information related variety and land selection via extension services may reduce the social cost of improper decision in the research area.

Keywords: Turkey, paddy production, economic losses, improper selection, social cost

1. Introduction

After the industrial revolution, causality the pressure of increasing populations, technological developments and the increasing of urbanization have begun to excessive use of natural resources and, especially huge damage the agricultural land (Cengiz, 2013). In recent years, the optimal use of resources has become the most important issue in the world. To meet the human's needs, therefore, productive and efficient in resource utilization to production is now a necessity. However, there is an over use of limited natural resources to more production. Inefficient resource use have occurred some problem such social, health and economic problems, especially environmental. Agricultural land, which is one of the most popular natural sources of production, faces many problems such as aridity due to extreme irrigation, drought, erosion, chemical pollution, and perhaps most importantly from non-agricultural purpose uses (Haktanir, 2000). The land is assessed in 8 classes according to its use capability. The first two

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classes are the areas with high productivity of agricultural production, the first four classes are in the area of arable land, while the last four classes are not in arable area. The fact that it is not used according to the capability of the land is a topic that is always on the agenda of Turkey. The agricultural land of Turkey, which was 26.5 million hectares ten years ago, declined by 3 million hectares in the last ten years to about 23.5 million. The share of agricultural land in total land has also declined from 34% to 31%. First and second class of land, which are the most productive agricultural land, equals 40% of the total agricultural land in Turkey (TURKSTAT, 2017). In Turkey, agricultural production has been conducted in improper areas and the requirements of land rehabilitation for crop production has increased due to settlements, industrial facilities and infrastructure services are made in the most capability land classes for crop production.

The wrong land selection problems affect not only farmers but also the society. One of the fundamental problems affecting the prosperity level of producers is that farmers' selection is based on the strict assumption of the equality of owned land production capability. Whereas, the idea of ignoring land capability class when allocating the land to the crop caused serious production and income loss. When considering the wrong variety selection, these losses is increased. The crop variety portfolio is rich worldwide and serves the different alternatives to the farmers. Therefore, selecting the best alternatives among the varieties is the vital decision of farmers (Collins and Edminsten, 2016)

Crop varieties are different from each the others in terms of technical and economical characteristics. The farmers' selection and use of correct crop varieties according to the ecological and topographical structure of the region comes out high productivity in crop production. That is why, variety selection based on the results of the field research has the priority together with the land selection for farmers and policy makers.

Producing in an improper land class and using the wrong crop variety causes to fall the productivity and the quality, resulting in a loss of farmers' income. When generalizing it to the society level, it is clear that there would be serious increase in social losses. In spite of the importance of the losses sourced from improper land and variety selection, there has been information gap on these issues. There has been several research on the physical side of this issue (Perrera et al., 1993; Mongkolsawat et al., 2002; Kuria et al., 2011; Sezer and Dengiz, 2014; Getachew et al., 2015). However, the information gap on the economic results of the improper land and variety selection has been still going on. One of the limited study focused on the individual cost of wrong variety selection was the research conducted by Collins and Edminston (2016).

Since the field research was completed related the effects of improper land and variety selection for paddy production in Samsun province, the study focused on the paddy farms to clarify economic dimension of social losses sourced from improper land and variety selection. The agricultural land of Samsun is 376 thousand hectares and constitutes about 40% of the total area of the Samsun (FAL, 2015). Samsun province meets the 14% of the paddy production of Turkey's total paddy production, which is 810 thousand tons (FAOSTAT, 2017) and Samsun is the second order paddy producer in Turkey (TURKSTAT, 2017).

In order to increase knowledge related the economic dimension of the effects of improper land and variety selection, the main purposes of the study were to calculate the

economic losses due to improper land and variety selection for crop production and to develop the strategy and policy in order to minimize it.

2. Data and Method

Research data were collected from two different sources in Samsun province such as field trials conducted to determine the land capability classes and the performance of paddy varieties, and randomly selected 45 paddy farmers by using questionnaire.

In the study, data collected from field trials and farmers were incorporated to calculate the individual and social losses sourced from improper land and variety selection. When examining the effects of improper land use, three different classes of land capability (S1, S2, S3) were considered. S1 represented the first class land, which was the most proper agricultural land, while S2 and S3 represented the second and third class land, respectively. Economic losses have been calculated using land size (hectare), production (kg), yield (kg per hectare), labor use (hours) and the opportunity cost (\$). For each land capability class (S1, S2, S3), data collected from farmers evaluated together with the trial results. Considering the opportunity cost principle, the unit cost of paddy was calculated by dividing the total production costs of the paddy by the land paddy yield (Kıral et al., 1999). Production costs were calculated separately as fixed and variable costs.

The economic losses caused by improper land and wrong variety selection in paddy farming were examined under two components such as individual loss and social loss. In the field of research, individual loss for paddy farmers consists of two main components. The first component was the improper land use loss that caused by the paddy cultivation in the S2 and S3, instead of growing paddy in the S1 land class. This loss was calculated by subtracting the amount of paddy produced under farmers' condition per hectare improper land, which was obtained via questionnaire, from the average paddy yield obtained from field trial results in the most proper land (S1). The second component was loss sourced from incorrect variety selection due to farmers producing different varieties instead of the highest yielding varieties. The loss sourced by the use of wrong varieties was calculated by subtracting the amount of paddy obtained from the field trials using the varieties used by the farmers, from the amount of paddy obtained in the trials using the best paddy varieties.

When calculating the social losses, opportunity cost and agricultural land allocated to paddy cultivation were used based on the current figures of the research area. The most profitable crop, which can be growth in the S2 and the S3 land capability class, was selected for the opportunity cost. Considering the most profitable crop for opportunity cost, because of the cost and prices for the S2 and S3 land class was high in the research area, wheat revenue was taken as opportunity cost (FAL, 2015). To calculate the social loss, the economic losses caused by the wrong variety usage were multiplied by the size of the land. When including the loss due to the wrong variety selection to the social cost calculation, the wrong variety usage rate, which was 67%, determined by questionnaire was used. Opportunity cost of paddy production was accepted as zero where income of paddy was higher than opportunity cost.

3. Research Findings

3.1 Production Cost of Paddy Farming

In the research area, paddy production costs were calculated separately for each land capability use class. It was determined that the production cost of farms surveyed was \$ 198,01 in paddy production. 72% of production costs was variable costs, while that of fixed costs was 28%. The highest share in variable costs was the material cost (51%). It was followed by pulling power cost (26%), labor costs (11%), interest cost (9%) and repair cost (3%). Regarding the fixed costs, the rent cost had the highest share (74%) and it was followed by the depreciation cost by 16%, the administrative cost by 8% and the interest cost by 2%.

The average production cost of paddy was \$ 0.33 per kg. The production cost of paddy per kg for S1, S2 and S3 were \$ 0.29, \$ 0.31 and \$ 0.37, respectively. While the selling price of paddy per kilogram was \$ 0.33 in 2014 (TURKSTAT, 2015), it was found that the unit cost of paddy in S3 land class was higher than its selling price. In the other classes, selling price of paddy was found higher than unit production cost.

3.2 Individual losses of paddy farmers

In the research area, the paddy yields obtained from questionnaires and the field trials with the varieties commonly used by the farmers were determined to be close to each other. It was clear from the research evidence that both farming in the improper land capability class and preferring wrong paddy variety were an important problem for the farmers and society.

Table 1. Paddy yields associated with the land class for field trial and survey results (kg per hectare)

Land class	Field trial (on average of variety used by farmers)	Field trial (The most correct variety)	Responses from farmers
S1	7353,3	8137,5	7168,0
S2	6633,3	7342,0	6079,5
S3	5708,7	6909,5	5542,0

Based on the results of the research, farmers would produce about 8137 kg of paddy if they used the most correct variety in the most proper land class (S1), while it was 7168 kg per hectare under current farmers' conditions. It was clear that farmers in the research area couldn't obtain the highest yields by using their variety preference. If the farmers produced paddy in improper land class, the serious yield reduction would arise, even if the best varieties were used.

The results of the analysis showed that farmers who were growing paddy in S2 land class in Samsun province were suffering from a total loss of 1982,5 kg per hectare. 1273,8 kilograms of this loss was caused by growing paddy in the improper land capability class and 708,7 kilograms due to the wrong variety usage. It was estimated that the farmers cultivated paddy in S2 land class faced with an individual loss by \$595. 64% of this loss was due to improper land, and 36% was due to wrong paddy variety selection. The individual loss was greater for a farmer who grows paddy in the S3 land capability class

than that of S2 ones. These farmers have suffered from an individual loss of \$900 due to a total loss of 3012 kilograms of paddy per hectare (Table 2).

Another striking result of the individual loss calculations was that the farmers who cultivated paddy in the most proper land class (S1) in the investigated farms suffered from significant level of individual loss due to the wrong variety of selection. This value was calculated as \$ 235,3 per hectare in Samsun (Table 2).

The results confirmed the results of previous study conducted by Collins and Edminston (2016). They suggested that farmers in the North Carolina were suffering an average of \$156 per hectare in large parcels and \$ 224 per hectare in small parcels due to the wrong cotton variety selection.

Table 2. Individual losses due to wrong paddy varieties and improper land use

Land class	Improper land losses		Wrong variety losses		Individual losses	
	kg ha ⁻¹	\$ ha ⁻¹	kg ha ⁻¹	\$ ha ⁻¹	kg ha ⁻¹	\$ ha ⁻¹
S1	-	-	784,2	235,3	784,2	235,3
S2	1273,8	382,1	708,7	212,6	1982,5	594,7
S3	1811,3	543,4	1200,8	360,2	3012,1	903,6

3.3 Social losses

Farmers cultivated paddy in the 4305 hectares of land in the research area. It was fixed that 67% of the paddy farmers did not use the best based on the data obtained farmers via questionnaire. Research results showed that the social losses for paddy in Samsun were calculated as \$ 2,1 million for 4305 hectares. 62% of this losses occurred in S2, 23% in S3 and 15% in S1 land capability class. When the sources of economic losses were investigated, it was seen that 24% of the total losses were due to the opportunity cost and 76% was due to the selection of improper land and wrong variety use (Table 3). Similar results obtained from the research conducted by Collins and Edminston (2016). They stated that there was an economic loss of between \$ 25,080,000 and \$ 34,200,000 for 380,000 hectares of cotton land in North Carolina.

Table 3. The social cost of improper land and variety selection

Land class	Land size (ha)	Improper land Selection (\$/ha)	Wrong variety Selection (\$/ha) *	Opportunity cost (\$/da)	Social cost (thousand \$)
S1	2039,20	0	235,3	0**	321,48
S2	1772,40	382,1	212,6	222,9	1324,77
S3	492,90	543,4	360,2	222,9	496,66
Total social cost					2142,91

* While calculating the loss due to the wrong variety selection, the wrong variety usage rate (%67) determined by questionnaire was used. For this reason, to calculating the social loss, the economic losses caused by the wrong variety usage were multiplied by the size of the land.

** Net income from paddy production was accepted as zero because it was higher than opportunity cost.

4. Conclusion

Under the light of the evidence obtained from the study, in which it was aimed

to determine the economic losses caused by the production on improper land and using the wrong variety. In the research area, the highest production cost of paddy was in S3 land class, while the lowest one was in S1 land class. Based on the results of cost analysis, there was the necessity of growing different crops and variety in the S3 land capability class. The result of the S2 land capability class indicates that the farmers in this class should change their production patterns.

Individual loss due to improper land use and wrong varieties use was about \$1700 per hectares. While producers do not have a chance to select land, rational decision making in selection of correct varieties will minimize losses. In case of land use, the losses can be minimized by cultivating the crops supported by the research results suitable for the land class.

When the individual losses were generalized for overall very high social losses occurred. This is also the reason for the term social loss. The social loss in paddy production was about \$ 3 million for Samsun province. To reduce the losses, they were proposed a) developing profitable production activities supported by field trials and economic analyzes, b) emphasize on extension studies for the farmers to adopt the proposed variety, c) using the most productive varieties proper for the land

In order to reduce the social losses in the research field, it is necessary to increase the number of agricultural extension activities and production efficiency on variety selection in paddy farming. To ensure the proper farm practices in accordance with land capability class, however, the soil survey studies should be made and its results should be shared with producers through informational meetings.

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