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An Overview of the Factors Affecting the Incidence of Wheat Crop Losses and Providing the Strategies to Reduce it in Iran

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ABSTRACT: Large amounts of currency are annually spent on wheat imports. On the one hand, evidence suggests that wheat and bread wastes are very high in Iran. The controversial issue of the growing food waste process is one of the major challenges for many countries, especially developing countries. In the Third World, politicians and thinkers of scientific assemblies have sought to reduce the losses of agricultural crops in the stages of planting, growing, and harvesting as well as distribution and consumption stages. Overall, the amount of wheat losses in Iran can be divided into several categories: (1) Losses at the planting stage, which is related to the excess amount of seed consumption. This amount is usually about 20% of total seed consumption, which is about 2% of the total waste of wheat production of the country and is mainly due to the lack of proper planting techniques and the application of inappropriate planting techniques, such as using the centrifuge or hand sprayers, lack of proper land preparation and inadequate irrigation system. (2) Losses in the growing stage containing 3% of the total production are usually caused by adverse weather conditions, poor soil texture, pests and diseases. (3) Losses in the harvesting stage, which accounts for 10% of the wastes, include losses due to delay in harvest or losses due to the use of harvesting machinery and equipment. (4) The delay factor in harvesting is different based on the type of machine and life of its operation due to the shortage of harvesting machines and wastes caused by harvesting machinery and equipment. Post-harvest losses of wheat are 15%, which is usually due to inefficient transport vehicles, inappropriate storage, lack of efficient silos, etc. Management of reduction of agricultural product wastes first of all requires knowledge about attitude and belief of farmers regarding the management of agricultural crop wastes.

Keywords: Wastes, wheat, crop, agriculture, management, planting, growing, harvesting.

INTRODUCTION AND LITERATURE REVIEW

Millions of dollars are annually leaving out of the country for importing materials including:

-Livestock and poultry feed, various types of human, livestock and poultry consumption proteins and their supplements;

-Types of amino acids such as lysine, alanine, citric, lactic, glutamate and others;

-Types of chemicals such as alcohol, furfural, pectin, acetone and so on;

-Variety of essential oils for the consumption of food and health industries; and

-Types of paper and its pulp.

And this process takes an increasing rate each year, while the volume of agricultural wastes in the country's farms can be considered notably. This issue is important when it comes to recognize that waste and residues of farms in other countries are the main supply source of these materials for export to Iran and similar countries. In all agricultural processes and related industries, secondary products are also produced in addition to the principal products, which include a large volume; and many advanced and developing countries consider a higher value for them because of the wide range of applications for these products; so that they are also much more valuable than the main product in some cases. On the other hand, according to the statistics available in Iran, almost half of agricultural products are destroyed in various stages without being consumed, and the converted industries in Iran have not reached the level of growth that can take full and proper advantage of all the components of an agricultural product.

As mentioned above, all of these imported items and hundreds of other valuable materials are currently produced worldwide from agricultural wastes and by-products during a coherent program in the converting industries, and according to the statistics and data on the volume of the abovementioned materials in Iran, if there is a well-designed program and a proper mechanism in planning, obtaining new technologies and organizing the old ones, you can boost the agricultural economy and agriculture itself by using these materials, which also cause environmental problems in most cases, in order to apply them optimally and convert them to the valuable materials. Worldwide reports show that work on this field, i.e., achieving cost-effective and feasible processes for recycling and processing the lateral products and wastes, has grown in recent years, and undoubtedly biotechnology has played a major role in this regard. By a comprehensive study on all agricultural products produced in Iran, the most important items that can be invested on their losses include wheat, rice hulls, oilseeds, tomato, potato, sugar beet, cotton, sugarcane, Citrus fruits, apple, grape, dates, pistachio, almond, walnut, tea and olive. Meanwhile, considering that the wheat crop has a high production and consumption level in Iran and the world, it is important to study the causes and factors that affect the amount of this crop wastes. A lot of studies have been carried out on wheat, flour and bread wastes so far, which are some of them that are more related to wheat wastes as follows:

Wheat is one of the first plants to be cultivated by humans and wheat was also considered to be the most consumable and valuable cereal for human beings according to historical texts from 2000 BC. Wheat plays an important role in the dietary pattern of three quarters of the world's population, which includes mostly poor and low income nations because of its nutritious and cheapness compared to other similar foods. In today's world, wheat is not only an essential nutrient, but it also politically has the same importance as oil (Keshavarz *et al.,* 2002). The study of world wheat production during the period of 1998-2007 showed the growth by 10 million tons per year. Iran has a very low yield per unit area than many European and American countries due to its special climate situation, while per capita consumption of wheat in Iran is higher than most countries in the world. Wheat, like energy, is a well-known strategic commodity and is considered as one of the most important agricultural indicators in Iran. Currently, a large share of the agricultural potential of the country is devoted to wheat production, i.e., about 5.1 million hectares, accounting for about 25% of the approximate losses of wheat in the country, about 3 million hectares of prone lands are wasted with all used agricultural inputs in the country, and this contradicts with the goals of the agricultural sector to achieve self-sufficiency. In this condition, the farmers' lack of familiarity with the management approaches of waste reduction due to the lack of knowledge of farmers is in the wake of a catastrophe. Farmers' education about waste management and the promotion of new methods in planting, growing, and harvesting of wheat can reduce 80-90% wastes in these stages (Asadi *et al.,* 2006). And also Behroozilar (1995) in the studies of cereal combine loss selected a number of combines in Khorasan, Isfahan, Gorgan, Fars and Hamedan areas using random sampling, and measured five combine losses including natural loss, head loss, sloping loss, separator section loss and cleaner area loss. According to the results, the average total loss + natural loss was 7.78% in the province of Khorasan and it was 47.5% without natural loss, and the average total loss was 2.3% in Isfahan province and the highest loss was related to the head. The average loss percentage was for Gorgan, Fars and Hamedan provinces 5.5%, 4.5%, and 7%, respectively.

Hamidnejad (1999) determined the wastes on the economic evaluation of wheat losses from harvesting until the time of sale in Harat, Marvast and Abarkouh placed in the Yazd province by using the Dalinous method and classification by assigning the optimum of some of the wheat farmers. The researcher made the required sampling from the selected wheat farmers fields in order to determine the quantitative losses (natural loss, harvesting and thrashing) and qualitative wastes (wheat mixing and contamination), and then specify the economic value of each one. According to the results, the average wheat natural drop was 27 kg per hectare. The wheat losses were less in the harvesting method with sickle and the average of losses based on the harvesting method was 100 kg per hectare. Wheat losses were estimated 58kg per hectare that it is more in the threshing method with combine than machine threshing. Cracked wheat from a combine threshing is more than machine and hand threshing. On average, 199 kg of Cracked wheat is available per hectare. The amount of solids in threshed wheat was 37 kg per hectare on average. A quantity of 112 kg of barley was averagely available per hectare after harvested wheat threshing. The average of bug-damage wheat crop was 67 kg per hectare, the weight of wheat with covered smut was 2 kg, and the weight of wheat with symptoms of disease and pests was 98 kg per hectare. The total value of wastes of natural abscission and harvesting and threshing methods was on average 84597 Rials per hectare. About 60% of the total value of wastes is related to Abarkouh area.

According to the survey, harvesting method and threshing by combine account for about 69% of the total waste value. Only 23,620 tons were pure wheat of the total wheat purchased by the government in the region (26,150 tons) and the remaining were included into weeds (166 tons), solids (195 tons), barley (650 tons), wheat contaminated with pests and diseases (540 tons) and cracked wheat (976 tons). Therefore, the presence of difference between the total amount of purchased wheat and the amount of pure wheat has caused the wheat growers face a reduction of 8.7 Rials (4.7 Rials non-useful loss and 4 Rials useful loss) for a kilogram of delivered wheat.

Hamidnejad *et al.* (2001) in the report of economic situation of wheat in Iran stated that losses from wheat production outside the state system and the losses from processing wheat to flour during the years of 1983-1991 were 242000, 533000 and 383000 tons, which increased to 365000, 551000 and 445000 tons during the years of1992-1998.

Analysis of effective factors on farmers' attitude towards wheat waste management showed that it can be concluded that there is a negative and significant relationship with 99% confidence between the distance from service center and farmers' attitude toward wheat waste management. That is, as far as the distance between farmers' land and the service center increases, their attitudes toward wheat waste management are more negative. This suggests that the high distance between the service center and the farmer land reduces the use of farmers from training-extension programs of service centers. In the current condition, one of the main problems of agricultural sector in Iran is the losses. According to the estimation of Ministry of Agriculture-Jahad in 2006,15 million tons of 85 million tons agricultural productions are losses. Regarding the 25% share of agricultural sector from non-oil exports and about $ 2 billion foreign exchange in this sector, a total reduction in losses can increase the value of this sector by $ 350 to $ 400 million (Shadan, 2007).

According to the strategic importance of some agricultural crops and the government's decision to pay subsidies to such crops and, consequently, the low price of subsidized products for consumers and the lack of incentives for saving increases the wastes of products such as wheat. Briefly, it can be stated that the type of dealing with the losses and how to reduce it is important in order to achieve the relative self-sufficiency and more added value. Despite the undeniable capabilities in the agricultural sector, the main problem of the structure of agriculture is the lack of proper organization in comprehensive management and the lack of motivation for optimal utilization and sustainability of resources (Shadan, 2007).

DISCUSSION AND CONCLUSION

In general, the amount of wheat losses in Iran can be categorized into several categories: (1) Losses at the planting stage, which is the amount of excess seed consumption. This amount is usually about 20% of the total seed consumption, accounting for about 2% of the total country's wheat losses, mainly due to technical vacuum and unsuitable planting practices such as centrifugal or hand sprayers, lack of proper land preparation and inadequate efficient irrigation system; (2) Losses in the growing stage, which comprise 3% of production, are usually caused by adverse weather conditions and inappropriate soil texture, pests and diseases; (3) Losses in the harvesting stage, which make up 10% of the losses, include: losses related to delay in harvesting or loss due to the use of machinery and harvesting equipment. (4) The delay factor in harvesting due to the shortage of harvesting machines and wastes caused by machinery and equipment, depending on the type of machine and its operation life. The post-harvest losses of wheat is 15%, which is usually due to inefficient transport vehicles, improper storage, lack of efficient silos, etc. (Malekan, 2003).

Management of reduction of agricultural products' losses requires first of all recognition of farmers' attitude and belief related to the management of agricultural product losses. Paying attention to wheat farmers is in the first place in order to manage wheat losses, and their attitude analysis is important to help managers and practitioners to be aware of their thoughts and to use them in order to realize their goals. Basically, attitude is a type of mental and neurological state that is organized by experience and has a direct and dynamic effect on individual reactions to all phenomena and situations that he deals with (Nikgohar, 1999). So that people are prepared for specific behavioral responses. Therefore, if a person has a positive attitude towards a given subject, he is ready to help, reward or support it; and, conversely, if he has a negative attitude towards the particular subject, he is ready to damage, punish or destroy it (Mohseni, 2000). In the meanwhile, the positive and negative attitudes of wheat farmers regarding the management of losses can influence their behavior toward acceptance and application of the waste reduction operations by them.

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