

**THE 'TIR' SEEDING METHOD AND ITS
APPLICATION IN THE VAN REGION**

Nuri YILMAZ () Ahmet AKYÜREK (**)*

Introduction

Wheat production holds an important place in Turkish agriculture and is the most important crop in the Van region.

Despite the extensive wheat-growing areas in the region, the wheat yield per decare is low. The main reasons for this low yield are the soil characteristics, the scarcity of annual rainfall, and thereby the lack of moisture in the soil. The annual rainfall in Van is 380 mm and its distribution according to seasons is irregular. Therefore, first and foremost, it is only possible to obtain more yield per unit area by holding more rainfall in the soil as well as ensuring other yield-increasing factors. At present, there are three types of seeding practiced in the region: The Hand Spreading (or Broadcasting) Method, the Seeding by Seeders (Normal Drilling) and the 'Tir' Seeding Method. The Hand Spreading and Normal Drilling Methods are carried out in the conventional manner. Here attention will be focused on the 'Tir' or Deep Furrow Seeding Method.

(*) Yüzüncü Yıl Üniversitesi Ziraat Fakültesi Tar.Bit.Böl. Yard.Doç.Dr. VAN

(**) Yüzüncü Yıl Üniversitesi Ziraat Fakültesi Tar.Bit.Böl.Prof.Dr. VAN

The Historical Evolution of the Tir Seeding Method.

The instrument used in Deep Furrow Seeding since the early times of humanity bears some resemblance to the Tir Seeder used in Turkey today. The shape of this instrument is depicted on a cylindrical seal found in the Nippur digs, in the lower parts of Mesopotamia which appears to be a relic of the Sumerian Civilization dating back to 1700 B.C. (Figure 1).

This cylindrical seal was used to seal the possession mark on the cloth or the leather stretched around the mouth of a jar and fixed by clay (Ross, 1970). On this instrument displayed on the seal, there is a conic-shaped part which has the same function as those found in modern seeders. The conic-shaped part ensures that the seeds fall into the furrow opened by the plow.

Until recent times, the Turks living around the places where the waters of the Tigris and Euphrates Rivers collect have used Tir plow seeding for only one row at a time. The principal reason for this is that difference in the soil texture. In the field, the cultivation of heavy soils is more difficult than the cultivation of light soils. The second reason is that the pulling capacity of a pair of oxen used for plowing is only sufficient to pull one Tir plow and no more at one time. This instrument consist of an arrow 3.5 m in length and a board to which the arrow is linked (Figure 2). On the front lower portion of the board there is an iron plow to plow the soil. During the cultivation, a man stands on the front part of the plowing equipment and pressed the plow down into the soil opening a furrow 15-18 cm in depth while the other man drops the seeds between the wooden side boards. The soil dropped from the opened furrows covers the seeds with 7-10 cm of soil.

After 1970, the Soil and Water Regional Directorate in Van worked on the subject and tried to develop a more sophisticated Tir seeder. At the beginning, in collaboration with local farmers and iron-mongers, the directorate developed Tir seeders working in the same manner as the normal Tir seeders. This new type of seeder which has

no fertilizer-pouring system served only for seeding. Afterwards, the directorate prepared a project in their research institute to find new ways of improving the instrument. The Ankara Soil and Water Directorate's research institute developed a seeder which pours the seeds and the fertilizer at the same time and the results proved to be successful.

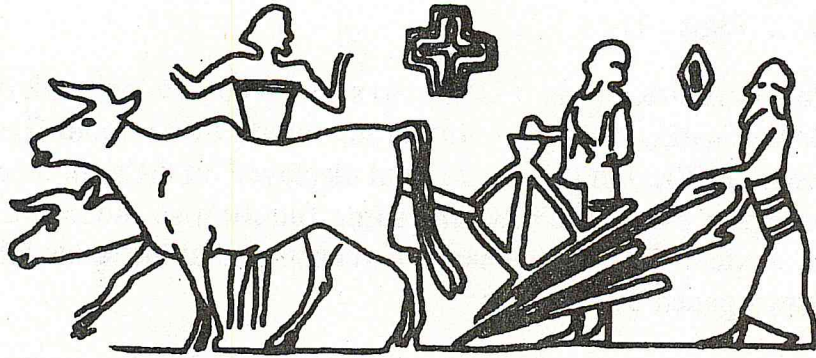


Figure 1. An old Tir Seeder pulled by oxen that was used for deep furrow seeding, as depicted on a cylindrical seal that was found in the Euphrates Valley excavations and is thought to date back approximately 3700 years.

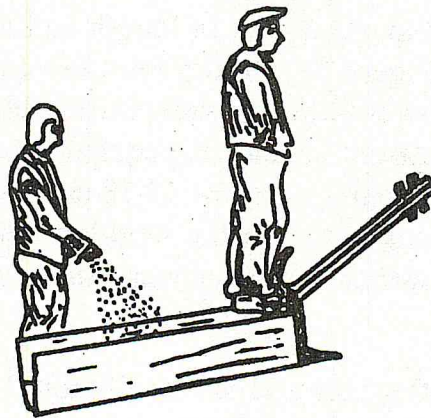


Figure 2. A Tir Seeder that seeds only one row at a time, used in Turkey before the 1950's.

From 1950 onwards, tractors have been used for cultivation in and around Ahlat and thus, the single-row Tir plow was insufficient and uneconomical, so a four-row Tir plow was devised which was obviously pulled by a tractor. For a long time, farmers used this primitive seeder.

The Soil and Water Directorate recommended this new type of seeder to the Turkish Agricultural Equipment Organization (Türkiye Zirai Donatım Kurumu) and to the local farmers. Then the Turkish Agricultural Equipment Organization produced these types of seeders and put them on sale for the farmers.

Unfortunately, the seeder wasn't adopted much by the farmers, the main reason being the weakness and easily breakable feet of the seeder and the frame (Figure 3). The decrease in demand for these seeders urged the institution to stop its production. Nevertheless, the local mongers have been producing seeders with a strong frame and seeder feet. This seeder is designed in a way which can seed 3 or 4 rows at a time and can pour fertilizer at the same time. The rate of the pouring of the seeds and the fertilizer can be adjusted in this equipment (Figure 4).

The Reasons For Using the Tir Seeding Method Around Lake Van

The Tir Seeding Method is being practiced with great success in the volcanic soils of the Van region. The most important reason for this is the texture of the soil. Volcanic soils, as it is known, form a very hard soil surface layer after a rainfall. In the Hand Spreading Method and Seeding by Seeders, seeds are placed into the dry part of the soil, approximately 4-6 cm in depth. The seeds wait until there is a rainfall to germinate. In autumn, with the rainfall the seeds germinate, but the germinated seeds cannot break the hard soil surface layer formed after the rainfall. This causes a heavy yield loss of almost 50 % or more every year. In the Tir Seeding Method the seeds are planted into the moistured layer of the soil at a depth of 15-18 cm and thus the germination occurs before the rainfall. In this way the effect of the hard surface is prevented.

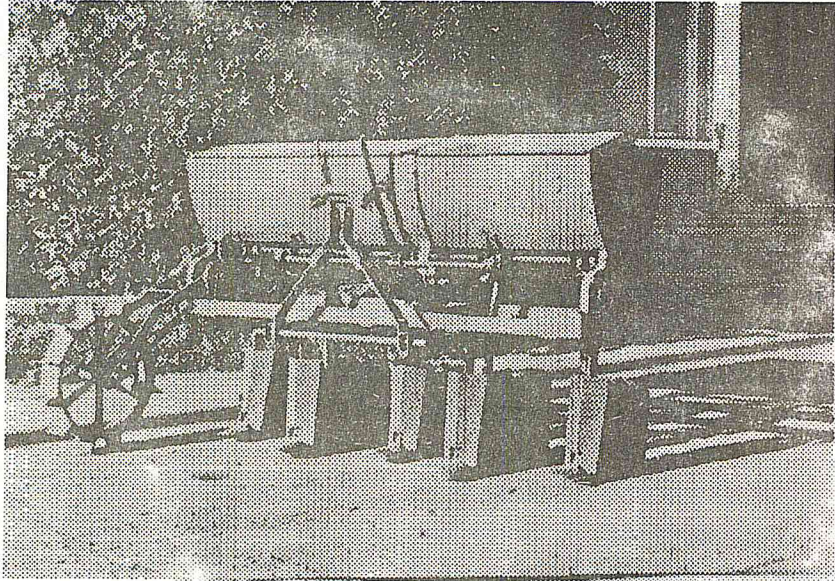


Figure 3. A Tir Seeder produced by the Turkish Agricultural Equipment Organization's Adapazarı Factory.

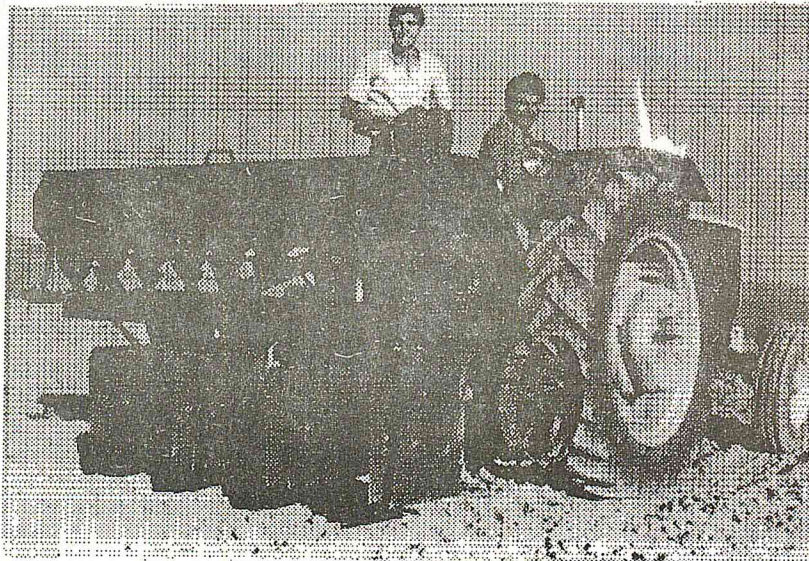


Figure 4. A Tir Seeder that seeds four rows at a time that is used successfully today by the farmers in the Van region.

Other major reason for practicing this method are :

1. It is very cold in the region. By starting seeding from mid-August, the seeds germinate earlier and develop more resistance to winter conditions. In winter snow fills up the furrows and protects the plants from the cold. In spring, rain and melted snow water fills in the furrows and keeps the soil moist for a long time. As a result, with the Tir Method, a relatively greater yield is produced.

2. The Tir furrows reduce erosion to a minimum level in volcanic soils provided that it is applied in contour to the slope.

3. One of the more important features of the Tir Method is that the amount of seed used per decare is comparatively low. The amount of seed used per decare, though it varies depending on the quality of the seed, the properties of the seed strain, the time of seeding, and ecological factors, is 12-15 kg/da in Turkey. In the Van region, this amount exceeds the standard values in the Hand Spreading Method and in Normal Drilling. For instance, in Hand Spreading, the amount of seed used per decare is 22-24 kg, in Normal Drilling it is 18-20 kg. However, in the Tir Method this amount is much less, about 8-10 kg per decare and the yield obtained is higher.

The Possibility of Practicing the Tir Method in Other Regions the most important factor affecting the Tir Method is the texture of the soil in the region. The Tir Method can be applied in soils of light volcanic origin. As far as we know, the farmers in South Dakota are also utilizing somewhat similar seeders in soils of volcanic origin (Ross, 1970).

A research was carried out on the Tir Method in Erzurum.

The pushing whells are designed to give continuous action with fixed cycles to the organs of the seeding machine. In addition, the pallets of the whells are designed in a way to sweep away the soil falling in the furrows. It has been reported that when the seeding feet are used somewhat shallower, such as 12 cm in depth, then the seeder could be utilized successfully in Erzurum (Tuncer, 1976). As a result of this, it is thought that the Tir Method can be practiced in other regions as well.

In this study we aimed at determining the most suitable seeding method for wheat in Eastern Anatolia where there are light soils of volcanic origin, insufficient rainfall and no irrigation facilities and where heavy winter conditions prevail.

Material and Method

Material

The experiment for the research was carried out in the coastal villages around Lake Van which have volcanic soils of brown and chestnut color. In the research, the yield obtained from Tir wheat (*T. Aestivum* Sap.) in the Hand Spreading Method, in Normal Drilling and in the Tir Method were determined. Tir Wheat is a strain used in the Tir Method in the region. It has two different forms, one with a black and the other with a white spike. It is soft winter wheat. The strain has thick straw and is resistant to diseases which are commonly seen in the ecology of Lake Van and can successfully be grown in poor soil conditions. The number of grains per spike ranges from 1 to 4. This strain doesn't show the same yield, resistance and quality characteristics in other ecologies (Kün, 1983).

Method

Around Lake Van, three locations were determined which showed the same climatic and soil characteristics. In each location, fields seeded by the above-mentioned methods were used. The plant height, plant density, number of spikes and grain yield per decare in these fields were taken into consideration.

To carry out the research, we started work in the fields on July 25th. Plant heights were measured in different locations, from each seeding method, and for each replication the plants were chosen at random. The length between the soil level and the spike top was measured in cm.

Plant density was determined as follows: An iron circle 1 m² in diameter was thrown four times at random in each planting method and the plants in the iron circle were counted.

The number of spikes were determined by counting the spikes in the circle described above. Grain yield was determined from the 1 m² in diameter iron circle which was thrown four times at random in each planting method and the spikes in the circle were counted. The spikes collected were put into bags on which the name of location, planting method and the replication number were marked. Then the bags were brought to the labs where they were harvested and the grains were thrashed and put into paper bags again. After weighing the yields, the results were expressed as grams per m² and converted into kg/da.

In this study, the statistical analyses were carried out as repeated completely randomized design.

Findings and Discussion.

1. The Effect of the planting method on the height of the plant

The average plant heights are as follows:

1. Tir Method 72.28
2. Normal Drilling 65.50
3. Hand Spreading 56.84

Statistically significant differences between plant heights were found. However, the difference between the Tir Method and Normal Drilling was insignificant. The highest plant height, compared with other methods, was seen in the Tir Method. This was followed by Normal Drilling and Hand Spreading. Under optimum conditions, the average plant height is 70-100 cm (Kün, 1983). Though there was a decrease in yield due to lack of rainfall in Turkey in 1985, in the Tir Method, which holds the moisture well, plant height was normal (72.28). However, in Normal Drilling it was 65.50 and in Hand Spreading it was 56.84.

When the above results are taken into account, the importance of the Tir Method will be clearly recognized.

2. The Effect of Planting Methods on the Average Plants Density

Plant density per m² according to the seeding methods were found to be as follows :

1. Tir Method	242.08
2. Normal Drilling	386.67
3. Hand Spreading	368.92

Statistically the difference between the Tir Method and the other two methods was considered to be significant, but the difference between Hand Spreading and Normal Drilling was insignificant. The highest plant density per square meter was in Normal Drilling, followed by Hand Spreading and the Tir Method. These are the expected values when the amount of seed used per decare is considered. For example, in Hand Spreading, the amount of seed used is 22-24 kg and in the Tir Method it is 8-10 kg. But due to various reasons, all of the seeds used didn't germinate. Because of this, compared with Normal Drilling, the amount of plants obtained were less in the Tir Method.

In the Tir Method the amount of seed used is considerably less when compared with the other methods. The difference between the Tir Method and Hand Spreading is about 12-14 kg.

However, the number of plants obtained in Hand Spreading is not so high, the difference is only 127 plants. It means that about 50 % of the seed used didn't germinate at all in Hand Spreading.

1. Tir Method	221.42
2. Normal Drilling	332.50
3. Hand Spreading	345.92

Statistically the difference between the number of spikes were found to be significant. However, the difference between Hand Spreading and Normal Drilling was insignificant. The number of spikes were the highest in Hand Spreading and this was followed by Normal Drilling and the Tir Method.

When the number of spikes per square meter were taken into account, the highest amount should be obtained in Normal Drilling, but this was not the case. The number of stems without spikes were the highest in Normal Drilling and this was followed by Hand Spreading and the Tir Method. The high number of stems without spikes decreases the water, air and plant nutrition materials required per plant. In this case, the plants will not reach full maturation which produces undesirable results for the yield.

4. The Effect of Planting Methods on Grain Yield

The average grain yield per kg/da was as follows :

1. Tir Method 143.97
2. Normal Drilling 129.51
3. Hand Spreading 105.11

Statistically the difference was considered to be significant, however, the difference between the Tir Method and Normal Drilling was insignificant. The highest grain yield was obtained in the Tir Method. The difference between Tir and Normal Drilling was not significant. When the amount of seed used per decare was taken into account, the Tir Method appears to be more advantageous when compared with the other methods. In addition to this, Akyürek et al. (1968) and Tosun and Ross (1970) have reported that grain yield obtained in the Tir Method is higher. The local farmers have confirmed this fact as well.

Results

The Tir Method, dating back to 3000 B.C. (Akyürek et al.,1968) is a different seeding method among the other conventional ones. In

and around Van, the soil is generally of volcanic origin. Moreover, the amount of rainfall during plant vegetation is insufficient. Due to these facts, in order to provide the seeds with the required moisture during the period of germination, the seeds are seeded at a depth of about 15-18 cm. Since the seeds are seeded deeper in the Tir Method, they germinate and mature easily by utilizing the necessary moisture in the soil. That is why the Tir Method increases the yield and hence is preferred by the farmers in the Van region.

According to the experiences of the local farmers, Tir wheat (*T. Aestivum* sap.) gives a greater yield when compared with other strains. The local farmers prefer the Tir wheat and have found some sort of relationship between the Tir wheat in the Tir Method.

A yield comparison hasn't been made by using Tir wheat and other strains with different seeding methods. Therefore, further investigation is required to find out the factors affecting yield increase in the Tir Method and whether this is the result of the seeding method or whether other factors are also involved.

This research has brought out the importance of the Tir Method in the Van Region where a large number of the farmers are growing wheat. The Tir Method, in the light of the facts given above, should be given more importance in the areas where the soil is of volcanic origin and is devoid of irrigation possibilities. A detailed investigation on seeding methods, on the time of seeding, different wheat strains, plant density and on doses of fertilizers will be needed. On the other hand, an attempt to find ways of application of the Tir Method in other dry areas is of great importance for both the Turkish economy and the welfare of the other dry land farmers.

LITERATURE

- Akyürek, A. Ross, G.J., 1968. Evolution of the 'Tir' or Deep Furrow Seeding of Dryland Winter in Turkey. Atatürk University, Erzurum, Turkey, (reprinted from Agronomy abstracts, page 50)

