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# The Effect of the Roughage Production Project on Forage Crops Agriculture in Kırşehir

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A R T I C L E I N F O

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A B S T R A C T

This study aimed to determine the effects of the Roughage Production Project on forage crop agriculture, which was carried out to introduce and extend forage crops to the region's producers and show how to produce cheap and high-quality roughage. In the research, a mixture of 70% Hungarian vetch and 30% triticale was grown on the lands of farmers selected from the region's producers, especially those engaged in animal production, during growing seasons between 2018 and 2024. Because forage crop agriculture is not sufficiently developed in the region, in the production carried out within the project's scope, one-on-one application was made to the producers in the field in all processes from planting to harvest. During the project, 1363 tons of quality roughage was produced on the areas of 6270 decares with 67 producers in seven production seasons. The Roughage Production Project practices have contributed not only to seed and fertilizer support for the producer but also to a change of habits through technical support provided at every stage of production, to producers' willingness to cultivate forage crops, and to the development of forage crop culture with mixtures created with species and varieties suitable for the ecology of the region. As a result, the Roughage Production Project has made a significant contribution to raising regional producers' awareness of producing their own quality roughage and establishing forage crop culture.

## 1. Introduction

Feed expenses constitute approximately 70% of operating expenses in livestock enterprises (Alçiçek, 2002; Budağ & Keçeci, 2013). Roughage, which is called dry, green, or silage feed, which is rich in cellulose and has low digestibility and energy value, can be included in rations at a rate of 25-80%, depending on the type of animal feeding (Kutlu & Çelik, 2010; Özkan & Şahin Demirbağ, 2016). The most important source of quality roughage used in animal feeding is forage crop farming and natural pastures (Yavuz et al., 2020). Unfortunately, in Türkiye, due to uncontrolled grazing that has been going on for a long time, both plant coverage of pastures and their ability to produce high quality forage have decreased significantly, and they have become unable to meet the needs of the livestock in Türkiye (Sürmen et al., 2008; Yildiz & Özyazici, 2017).

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According to the calculation made based on the forage crop production and livestock data of TÜİK (2024), Türkiye can meet approximately 41% of the quality roughage needs of 16.7 million animal units. The fact that the desired level has yet to be reached in forage crop agriculture for a very long time has resulted in using intensive cereal straw to close the quality roughage gap. This negative situation regarding quality roughage production in Türkiye manifests itself in Kırşehir under more severe conditions. When the total roughage requirement and production of Kırşehir province were calculated according to TÜİK (2024) data, only 9.5% of the need for 252 thousand animal units was met. Undoubtedly, this is due to the forage crop agriculture carried out on only 6 thousand hectares of arable land in the city and cereal straw is used much more intensively than the country average. Kir et al. (2018) emphasized that the most suitable species for quality forage crop production in Kırşehir ecology were Hungarian vetch (*Vicia pannonica* Crantz.) and triticale (X *Triticosecale* Wittm.), and the most suitable mixture to be created with these species was a mixture of 70% Hungarian vetch and 30% triticale.

The inadequacy of forage crop production in Kırşehir, or the roughage deficit, is related to producer habits rather than negative environmental factors. The aim of the Roughage Production Project, supported by the Strategy and Budget Directorate of the Presidency of the Republic of Türkiye and carried out within the Pilot Agriculture and Geothermal Coordinatorship of Kırşehir Ahi Evran University, is to show producers engaged in plant and animal production in the region how to produce cheap and high-quality roughage, and to introduce and extend the culture and agriculture of forage crops. The Roughage Production Project applications were distinguished from other forage crop support project applied by extension services of Turkish Ministry of Agriculture and Forestry through the technical support provided at every stage of production and the seed and fertilizer support given to the producer. This difference increases the study's originality. In this presented study, the effects of the Roughage Production project on forage crop agriculture in Kırşehir were examined.

## 2. Materials and Methods

The Roughage Production Project farmer practices were carried out in 25 different locations, including twelve villages in the Central district, one village in the Akçakent district, two villages in the Boztepe district, four villages in the Mucur district, and six villages in the Kaman district (Figure 1).


**Figure 1.** Locations of the application area of Roughage Production Project

Within the scope of the project, to introduce and extend forage crop agriculture, a mixture of 70% Hungarian vetch and 30% triticale was grown in the selected farmer lands, especially among livestock producers, between the 2018-19 and the 2023-24 production seasons under contract with 67 producers. In the mixture prepared with the classical method, 14 kg of certified seed per decare was used, including 8 kg Hungarian vetch and 6 kg triticale. Along with sowing, 12-15 kg of diammonium phosphate was applied according to the soil analysis results, and 3 kg of pure nitrogen ammonium sulfate fertilizer was applied as topdressing.

Since forage crop agriculture is not sufficiently developed in the region, the producers were given one-on-one training in the field in all processes from sowing to harvest, such as soil preparation, seeder adjustment, and determination of top fertilization time or cutting time, in the productions carried out within the project's scope. The project budget covered all seed and fertilizer expenses used in the project, and an average of 20% of the obtained roughage was taken as the project management share.

The Forage Production Project's impact on farmers' production habits was evaluated through the feedback of the project participants. In a survey conducted in October 2023, the participants were specifically asked three questions: Have you ever sown a Hungarian vetch-triticale mixture before? Did the project contribute to your knowledge of forage crop farming? Are you satisfied with the project results? In addition, to determine the contribution of the Roughage Production Project to the forage crop production areas in Kırşehir, the production area and production amount of Hungarian vetch and triticale from TÜİK data between 2016 and 2023 were compared.

## 3. Results and Discussion

In the roughage production project, between the 2017-2018 season, when the first project application was made, and the 2020-2021 production seasons, 63 tons of quality roughage from the mixture of Hungarian vetch and triticale was obtained in an area of 355 decares in the university application areas. Within the project's scope, 67 farmers produced 1300 tons of quality roughage in an area of 5915 decares with the cooperation of the project personnel in the 2018-2019 and 2023-2024 growing seasons (Table 1).

**Table 1.** Growing areas and production amounts of quality roughage within the scope of the Roughage Production Project

| Production Season | Number of Farmers | Area (da) | Production (tons) |
|---|---|---|---|
| 2018-2019 | 5 | 238 | 62 |
| 2019-2020 | 7 | 714 | 160 |
| 2020-2021 | 11 | 1567 | 154 |
| 2021-2022 | 30 | 2748 | 678 |
| 2022-2023 | 5 | 259 | 129 |
| 2023-2024 | 9 | 389 | 117 |
| 2017-2021 | UAA* | 355 | 63 |
| **Total** | **67** | **6270** | **1363** |

*UAA: University Application Areas

Before the start of the Roughage Production Project in Kırşehir, the growing areas of triticale and Hungarian vetch in the year of 2016 were 625 decares and 150 decares, respectively. In the year of 2023, these growing areas increase to 5464 decares for triticale and 3630 decares for Hungarian vetch (Table 2). Support program of the Ministry of Agriculture and Forestry for forage crops production since the year of 2000 has played a vital role in the increase of forage growing areas in Türkiye (Anonymous, 2024; Can et al., 2024; Merdan, 2024; Turan et al., 2015; Yavuz et al., 2020). However, it is impossible to say that all of this development in forage crop production between 2016 and 2023 in Kırşehir is due to the Ministry's support.

**Table 2.** Changes in Hungarian Vetch and Triticale Production in Kırşehir Between 2016-23*

| Years | Triticale | | Hungarian Vetch | |
|---|---|---|---|---|
| | Area (da) | Production (tons) | Area (da) | Production (tons) |
| 2016 | 625 | 140 | 150 | 135 |
| 2017 | 1700 | 535 | 7330 | 6027 |
| 2018 | 2124 | 781 | 5437 | 4513 |
| 2019 | 1766 | 610 | 4603 | 3846 |
| 2020 | 833 | 262 | 4994 | 4702 |
| 2021 | 4304 | 874 | 22743 | 17869 |
| 2022 | 4377 | 1259 | 11253 | 9834 |
| 2023 | 5434 | 1367 | 3630 | 2446 |

*(TÜİK, 2024)

The support program of the Ministry of Agriculture and Forestry has significantly contributed to sustainability by increasing production, it's clear that forage crop production has not yet reached the desired level, indicating a need for further improvement. Although increasing agricultural support increases producers' incomes, the success of the support is related to the producers' expectations and satisfaction (Çetin & Olhan, 2024).

According to the results of the survey conducted with project participant farmers in October 2023 to determine the effects of the Forage Production Project, 97.1% of the farmers stated that the project contributed to their knowledge of forage crop farming and said that they were satisfied with the project results, and 94.3% of them continued to grow the mixture of Hungarian vetch and Triticale after leaving the project. The high satisfaction and sustainability rates in the survey results are not only because the project covers the sowing costs but also due to the practical training provided in the field at every stage. These practices have significantly contributed to farmers' recognition of the forage crop culture and their knowledge of the subject. Therefore, it can be said that the Roughage Production Project was at least as effective as the support provided by the Ministry of Agriculture and Forestry in increasing the production of forage crops in Kırşehir province. Therefore, it is possible to say that the Roughage Production Project is more effective than the support provided by the Ministry of Agriculture and Forestry in the increase in the production of forage crops in Kırşehir.

## 4. Conclusion

According to the results of farmer applications in the Roughage Production Project, in addition to the financial support provided through the project to the producer, the technical support provided at every stage of production has made a significant contribution to the establishment and development of the forage crop culture by changing producer habits, making producers willing to do forage crop farming, and creating awareness of producing the quality roughage they need.

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