

Investigating the Economic Effects of Ferula Cultivation on Climate Change Management in Qadis District, Badghis, Afghanistan

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ABSTRACT

In Afghanistan, Ferula (Hing) has economic importance and promotes new cultivation patterns, especially in arid regions. Its cultivation is popular in Qadis district, Badghis province. The purpose of this study was to assess the impact of cultivation pattern change on climate change management through hing cultivation. A quantitative research approach employed a 30-item questionnaire to investigate variables including cultivation practices, income, consumption patterns, challenges, and farmers' satisfaction. Reliability and validity of the questionnaire were assessed, followed by descriptive statistical analysis. Statistical methods explored relationships between variables and the influence of knowledge and attitudes on climate change and hing cultivation. Hing cultivation positively impacted farmers' economic status in Qadis district. Most farmers (80%) preferred the Tajik variety, allocating 0.2-1 hectare of their lands to hing cultivation. Around 40% yielded 100-200 kg of hing per hectare, earning 2-3 million Afghanis. Overall, 75% of farmers expressed higher satisfaction with hing cultivation. Hing cultivation provides an efficient approach to climate change management in Qadis region. In conclusion hing shows high resistance to drought and offers significant economic benefits. The results of this study have valuable implications for policy makers and stakeholders and provide insights into the potential implementation of hing cultivation as a suitable solution for climate change management in similar regions.

Keywords: Badghis, Climate Change, Hing, Qadis District

INTRODUCTION

Hing (*Ferula assa-foetida* L.) is a medicinal plant that produces valuable oleo-resin. It is a culinary spice with a unique flavor. Climate change poses significant challenges to agricultural systems worldwide, particularly in regions characterized by arid and semi-arid climates. In this context, exploring sustainable cultivation practices that can mitigate the impact of climate change and enhance economic resilience becomes crucial. One such potential solution is changing cultivation pattern, like the cultivation of asafoetida or hing, a plant known for its resilience to drought conditions and economic viability (Sood, 2020).

Hing has a type of oleo-resin obtained from the rhizome and root secretions of it, has been widely recognized and utilized globally as a culinary spice due to its distinctive flavor profile (Shah *et al.*, 2020). Previous studies have shown that hing cultivation can offer economic benefits to farmers. For example, in a study conducted in neighboring regions, it was found that hing cultivation contributed significantly to the income of farmers, improving their economic well-being (Golmohammadi, 2019). The cultivation of hing has the potential to generate income through the sale of the oleo-resin, which has a high market demand due to its culinary and medicinal uses (Golmohammadi, 2013). The arid and semi-arid regions, characterized by water scarcity and vulnerability to climate change impacts, present an ideal context to investigate the economic viability of Hing cultivation as a climate change management strategy (Hajimirrahimi *et al.*, 2022).

The objective of this research is to examine the economic impacts of hing cultivation in Qadis district, Badghis province, with the aim of assessing its potential as a crucial strategy for managing climate change. The outcomes of this study can provide valuable insights for evidence-based decision-making among policymakers and agricultural stakeholders, facilitating the adoption of sustainable agricultural practices that enhance economic resilience in the context of climate change challenges.

MATERIALS AND METHODS

Study Area

A survey-based research study was conducted in 2023 to investigate the economic aspects of hing cultivation as a climate change management strategy in the Qadis district, Badghis province, Afghanistan.

Samples Collection

A comprehensive questionnaire was developed in collaboration with the members of the Badghis Agriculture Faculty to gather data for this research. The questionnaire consisted of 30 questions, encompassing various aspects of hing cultivation, including cultivation practices, income generated from hing cultivation, costs associated with cultivating one hectare of hing, challenges related to pests and diseases, and farmers' satisfaction levels with hing cultivation.

Statistical Analysis

To ensure the reliability of the questionnaire, Cronbach's alpha method was employed to assess internal consistency. Additionally, confirmatory factor analysis was performed to evaluate the validity of the questionnaire. Given the limited number of hing farmers in the Qadis district, the questionnaire was distributed to the entire population of hing farmers, comprising 22 individuals, to capture a comprehensive understanding of the subject matter. After data collection, descriptive statistical analysis was performed on the data. In this stage, various indicators of awareness and attitudes of farmers, such as average, median, and frequency distribution, were investigated.

RESULTS AND DISCUSSION

Following the recognition of the economic significance associated with cultivating Hing, 22 farmers in the Qadis district initiated cultivation of Tajiki variety of this valuable plant. The findings of this research hold substantial relevance for the government and other farmers, providing valuable insights for climate change management and altering cultivation patterns in arid and semi-arid regions of Afghanistan. The outcomes of this study aim to augment farmers' income in these areas and facilitate the implementation of effective agricultural planning in order to climate change management.

The results of the research show that more than 50% of the farmers have more than 8 hectares of rainfed lands where wheat, barley, chickpeas and cumin are cultivated. But the climatic changes, especially the drought crisis in recent years, cause the loss of all the crops and food insecurity in these areas. Some farmers started hing cultivation and 80% of them allocated 0.2-1 hectare of their lands for this crop.

In Figure 1, the study revealed varying hing resin yields per hectare among farmers in the Qadis district. The majority (40%) achieved yields of 100-200 kg ha⁻¹, while 20% obtained yields of 200-300 kg ha⁻¹, and 10% achieved yields exceeding 400 kg, selling their products from 15,000-20,000 Af kg⁻¹. The reason for different yields is related to the age of the crop. In the initial year of cultivation, expenses encompassed various aspects and the most expensive include buying seed (26,000 Af kg⁻¹) or seedling procurement. According to the survey, 40 percent of hing farmers say that the initial cost of one hectare is between 200,000-300,000 Afghani (Figure 2).

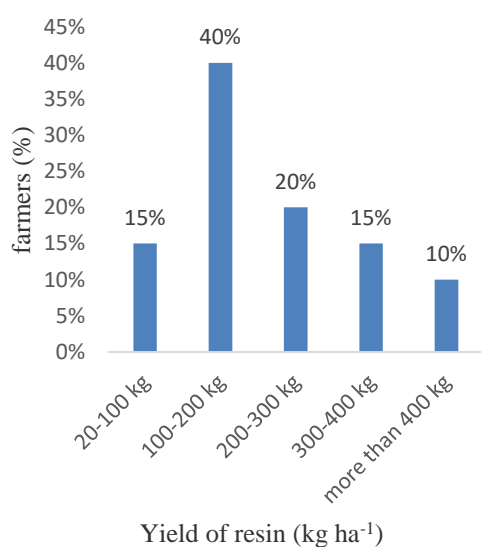


Figure 1 yield of hing resin in Qadis district

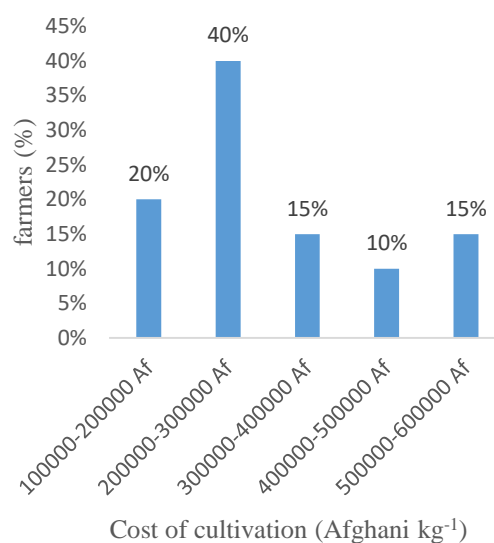


Figure 2 The initial cost of hing cultivation in Qadis district

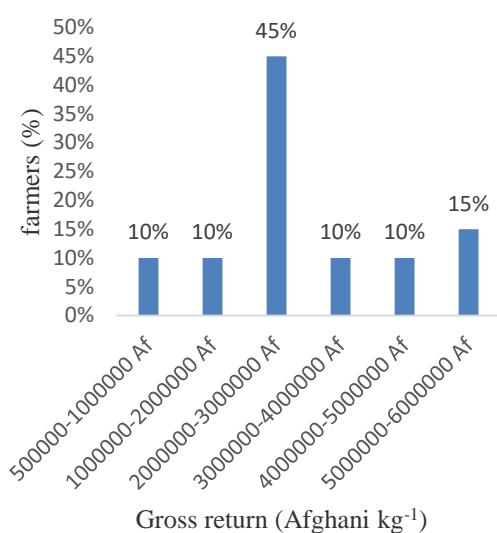


Figure 3 Gross return of hing cultivation in Qadis district

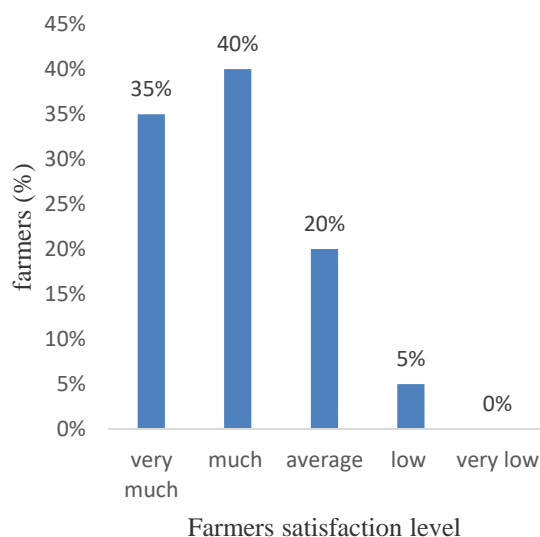


Figure 4 The level of farmers' satisfaction in Qadis district

Results show that 45 percent of the farmers from one hectare of hing have a gross return between 2 and 3 million AFN ha⁻¹ annually, and the higher income depends on the higher yield related to the age of crop and the skill of the farmers. In the survey conducted among the farmers of Qadis district, very significant results have been obtained regarding the level of satisfaction of the farmers. Based on this survey, it was found that 75% of the farmers are satisfied with the income of the hing cultivation. This result shows that the farmers have performed very well by changing their cultivation pattern. And they have been able to increase their income level and get more benefits than other agricultural products. Also, the level of satisfaction of these farmers has caused other farmers of this district to think about cultivating this valuable and economic crop. These results are consistent with previous studies by Golmohammadi (2013), Golmohammadi (2019), and Hajimirrahimi *et al.*, (2022). (Figures 3 and 4).

CONCLUSION

The cultivation of hing in the Qadis district has been found to be effective and has positively impacted the economic status of farmers. The Tajiki variety of hing is preferred by the majority of farmers (80%), who allocate an average of 0.2 to 1 hectare of their personal land for this cultivation. Around 40% of farmers achieve yields ranging from 100 to 200 kg ha⁻¹ of hing resin, with by selling their products at prices ranging from 15,000 to 20,000 Af kg⁻¹, they have earned 2-3 million Afghanis so 75% of farmers expressed higher satisfaction with hing cultivation compared to other agricultural products. Hing cultivation proves to be an efficient approach for climate change management in the Qadis region due to its high resistance to drought and the significant economic benefits it offers. The findings of this study hold valuable implications for policymakers and stakeholders, providing insights into the potential implementation of hing cultivation as a suitable solution for climate change management in similar regions.

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