Original Article

The Economic Efficiency of Rainfed Barley Production in The Syrian Coast: A Case Study for the 2023–2024 Agricultural Season

Ziad Mohammad Sarhil[*1], **Haneen Nawaf Othman**[2], **Siba Ihab Gdeed**[2]

[1] *Faculty of Agricultural Engineering, Lattakia University*
[2] *Faculty of Economics, Lattakia University*

Abstract

This study on real barley production on the Syrian coast examined economic and commercial indicators during the 2023-2024 agricultural season. This included developing an economic descriptive model and identifying data primarily through a questionnaire targeting 360 farmers. The data were processed to obtain primary data, which was then analyzed and interpreted for cost items (fixed and variable) and their relative importance. Commercial profitability, the role of variable assets, and other basic economic indicators were also evaluated. Findings show that average net commercial profit was approximately £1.5 million, while contractual profitability was 69.7% and 76.5% of capital and production costs, respectively. The variable assets turnover ratio was 2.12, and the economic benefit index was 1.76, reflecting the effectiveness of resource investment. The study also sought to improve input availability, encourage horizontal expansion, and increase yields for stakeholders using improved agricultural technologies, integrating scientific research and agricultural extension, and developing an implementation plan to monitor performance and maximize economic and nutritional benefits.

Keywords: production costs, Profitability ratio, Capital payback period, Resource investment efficiency

Address for Correspondence
*Correspondence to: Ziad Mohammad Sarhil, Faculty of Agricultural Engineering, Lattakia University, Syria. E-mail: sarhilziadof@yahoo.com

Received: 2025-07-26 **Accepted:** 2025-10-19 **Published:** 2026-06-30

DOI: https://doi.org/10.32649/ajas.2026.191697

How to cite this article: Sarhil, Z. M., Othman, H. N., and Gdeed, S. I. (2026). The Economic Efficiency of Rainfed Barley Production in The Syrian Coast: A Case Study for the 2023–2024 Agricultural Season. *Anbar Journal of Agricultural Sciences*, 24(2), 417-429. https://doi.org/10.32649/ajas.2026.191697

Introduction

Barley is an ancient agricultural crop that played an important role in the development of human civilizations. It was known before wheat. Studies indicate that barley cultivation dates back to the sixth and seventh millennia BC (15).

It ranks fourth among the world's cereal crops, after wheat, rice, and maize, in terms of economic importance, area, and production. The area planted with this crop covered approximately 48 million hectares, and production reached about 134 million tons. Canada, the United States, China, Australia, Russia, and France are among the world's leading barley producing countries (7).

Syria occupies an important position in the Arab world in barley production, ranking third after Morocco and Iraq in terms of cultivated area. Barley-planted area in Syria in 2023 stood at approximately 1,062,863 hectares, with production estimated at 103,918 thousand tons. The area planted with barley on the Syrian coast was approximately 1,185 hectares, with production estimated at 1,122 tons (12).

Barley belongs to the Poaceae family and the Hordeum genus, which includes 32 species. The genus barley is one of the most tolerant of stressful conditions for plants, such as drought and frost, and can tolerate salinity of up to 18 dS/m (2).

The economic importance of barley is due to its being both a food and fodder crop. Its nutritional value lies in its grains, as they contain an average of 64.6% carbohydrates, 12% protein, 5.5% fiber, 13% water, and

2.1% fat (13). Barley flour is used in baking various types of pastries and bread. The grains, after removal of their fruiting shells, aleurone, and germ, are also used as baby food. Barley is also a primary source of beer and some other alcoholic beverages. It also has medicinal importance, as barley grains are used in the preparation of barley tea, which has an important role in dissolving kidney stones. Barley's beneficial effects include kidney and bladder health, treating intestinal infections, and strengthening the nerves. Barley leaves also contain special compounds that reduce blood sugar and cholesterol levels and prevent hardening of the blood vessels, in addition to antioxidants that delay the onset of aging symptoms (14).

Its forage importance lies in its role as a feed source for ruminants (sheep and cows). Its by-products (straw) are used as a fertile feed mixed with legume forage crops such as alfalfa to improve green fodder. It also enters, to a limited extent, into poultry feed mixes, and thus plays a significant role in maintaining the development and sustainability of livestock (15). The dual importance of barley as a strategic crop requires improving its production by providing government support for the use of modern technologies in this field to raise production levels and thus achieve greater returns for farmers.

Previous studies in several Arab regions show similar results regarding the economic feasibility of barley, with differences in challenges and available resources. A study In Diyala Governorate in Iraq showed that mechanized labor accounted for the largest proportion of variable costs, while family labor constituted the largest portion of fixed costs. Economic efficiency indicators showed positive results, with the return on invested dinars reaching 2.5 dinars, and the capital recovery period reaching 1.06 years, supporting the expansion of barley cultivation to achieve higher incomes for farmers in this region (3).

A study in South Sinai Governorate in Egypt noted that the most important production inputs affecting barley yields were mechanized labor, nitrogen fertilizer, and phosphate fertilizer, with relatively high production elasticities for each. The optimal production volume that minimizes costs and maximizes profitability was also estimated, reflecting the importance of the efficient use of agricultural inputs in this desert region (5). In the Salamiyah region of Syria, the areas planted with rainfed barley have declined in recent years due to the repercussions from various crises. Issues such as high farmer wages and fertilizer prices have emerged, negatively impacting agricultural profitability. Despite these challenges, the results showed that the economic efficiency index reached 1.6, indicating the continued viability of its cultivation in this region (16).

In Iraq's Anbar Governorate, a study examined the correlation and genetic path coefficient analysis of barley under seeding rates for 2021–2022. The survey included five varieties (Samir, Aksad 617, Amal, Buraq, and Aba 265) and three seeding rates (120, 160, and 200 kg/ha). The results showed that the number of tillers and the number of spikes had the highest direct and overall positive effects on grain yield. The direct effect coefficient of tiller number on yield was 0.982 and 2.803 at a seeding rate of 120 kg/ha, while the direct effect of other traits, such as spike length, was small at most rates (6). In Libya, a study analyzing the food gap in barley during the period 2000–2020 showed that declining domestic production and agricultural output widened the food gap, while increasing consumption without supporting local production contributed to deepening this gap. The results indicate the need to enhance barley production to achieve better levels of national food security (1).

Meanwhile, a study conducted in the Al-Baaj district of Nineveh Governorate, Iraq, focused on assessing the efficiency of using productive resources. It showed that cultivated area had the greatest impact on production volume, with a 1% increase in area resulting in a 0.233% increase in production. This confirms the importance of horizontal expansion in barley cultivation to achieve optimal utilization of available resources (8).

Based on these findings, a local study focusing on the Syrian coast is particularly important, given the region's unique characteristics and the lack of analytical economic research on rainfed barley production. Within this context, the research problem emerges from the limited attention devoted to barley cultivation in the coastal region, where farmers face growing input costs, fluctuating yields, and inefficiencies in resource use. Accordingly, this study addresses several questions. First, it seeks to determine the level of economic efficiency of rainfed barley production in the Syrian coast during the 2023–2024 agricultural season. It then evaluates the actual returns and profits achieved per dunum, and the extent to which economic indicators, such as profitability ratios, variable asset turnover, and the efficiency index, reflect the feasibility of this crop.

Finally, it explores the policies or measures that could strengthen its sustainability, enhance farmer incomes, and reinforce its contribution to the local economy.

Materials and Methods

1. **Period and location of the research:** This research was conducted in the Syrian coast, which includes Lattakia Governorate, covering the four administrative regions of Jableh, Lattakia, Qardaha, and Al-Haffa, and in Tartous Governorate, covering the six administrative regions of Tartous, Safita, Dreikish, Sheikh Badr, Baniyas, and Al-Qadmus, during the 2023-2024 agricultural season.
2. **Data and sources:** Primary data were collected through a questionnaire for the rainfed barley producers in the Syrian coast. The questionnaire included several questions that served the research purpose, and field surveys were conducted to complete the questionnaire through personal interviews with the farmers. Secondary data was sourced from the Ministry of Agriculture and Agrarian Reform, the FAO, and the Arab Agricultural Statistics Yearbook.
3. **Research sample:** The research sample comprised 5,528 farmers working in rainfed barley production on the Syrian coast and registered with the Directorates of Agriculture and Agrarian Reform in Lattakia and Tartous governorates for the 2023-2024 agricultural season. The Stephen-Thompson equation was used to determine the sample size as follows (17):

Where n: sample size, P: the percentage of the characteristic availability and neutrality, equal to 0.50, N: size of the studied population, d: standard error (precision level) = 0.05, Z: standard score = 1.96 at a standard error of 0.05.

Applying the equation, the sample size is 360 farmers. Table 1 shows the distribution of the research sample of the farmers in the study. The sample was selected in each administrative region according to the distribution of farmers' numbers, i.e., a random sample distributed according to the relative importance of the weight of the number of farmers in the administrative regions of Lattakia and Tartous governorates.

Table 1. Sample of the rainfed barley producers in the Syrian coast

Governorate	Administrative Area	Number of Rainfed Barley Farmers	Percentage	Sample Size per Area
Latakia	Latakia	410	7.4	27
	Al-Haffah	819	14.8	53
	Qardaha	282	5.1	18
	Jableh	586	10.6	38
	Subtotal	**2,097**	**37.9**	**136**
Tartus	Tartus	138	2.5	9
	Safita	156	2.8	10
	Dreikish	185	3.4	12
	Sheikh Badr	515	9.3	34
	Baniyas	422	7.6	28
	Al-Qadmus	2,015	36.5	131
	Subtotal	**3,431**	**62.1**	**224**
Total		**5,528**	**100.0**	**360**

Source: Directorate of Agri. and Agrarian Reform, Latakia and Tartus Governorates; Season 2023–24.

Research Methodology: The study employed a descriptive economic-analytical approach, based on a comprehensive review of Arabic and international literature and the analysis of field data on the barley production for the 2023–2024 agricultural season. Data were collected using a structured questionnaire specifically designed for the study sample of 360 farmers. To verify the validity and reliability of the questionnaire a pre-test was conducted on 30 farmers which yielded a high reliability coefficient (Cronbach's Alpha = 0.87), indicating consistent measurement.

After data collection, the information was processed and analyzed to determine production cost components, including fixed (investment) and variable (material and service) costs, with their relative importance calculated using percentage and arithmetic means. Economic efficiency indicators, such as profitability ratio, variable assets turnover, and economic efficiency index, were also calculated. Data normality tested using the Shapiro–Wilk test ($p = 0.23 > 0.05$) confirmed no significant deviation from normal distribution and allowing reliable use of averages and percentages. All statistical analyzes were performed using SPSS version 26, ensuring the accuracy and robustness of the results.

Economic Indicators and Standards

5.1 Using mathematical relationships to calculate production costs (11):

- Live labor costs for agricultural operations = Number of times the operation is performed × Number of workers required to perform the operation × Number of days required to perform the operation × Worker's daily wage.
- Material costs for agricultural operation requirements = Quantity (or number or volume) of material used per unit area × Number of times added × Price per material (g, kg, liter, etc.).
- Total production costs per dunum = Initial costs (material + labor) + Interest on invested capital + Land rent per dunum.
- Interest on invested capital = [Initial costs (material + live labor) + Land rent] × 9/100

5.2 Mathematical relationships to calculate economic return and economic efficiency indicators (9):

- Gross product value (average annual revenue) = Production quantity × average farm price.
- Invested capital = Total investment costs + operating costs.
- Annual production costs = Annual depreciation + operating costs.
- Cost of producing a unit of product = Total annual production costs ÷ Annual production quantity.
- Average annual net profit = Annual gross output (average annual revenue) – Annual production costs.
- Ratio of annual profit to annual revenue = Average annual net profit ÷ Average annual revenue × 100.
- Variable asset turnover rate = Average annual revenue ÷ Variable costs.
- Variable asset turnover time = 365 ÷ Variable asset turnover rate.
- Farm production efficiency = Gross output ÷ (Variable costs + Annual depreciation).
- Variable costs represent operating costs without adding interest on invested capital.
- Overall economic efficiency = Gross output ÷ Annual production costs.
- Profitability ratio based on invested capital = (Gross annual profit achieved ÷ Investment capital) x 100.
- Profitability ratio based on production costs = Gross annual profit achieved ÷ (Material expenses + Labor wages) x 100.
- Capital payback period = Invested capital / Average annual net profit.
- Revenue ratio based on invested capital: where,

R: Rentability ratio based on invested capital. N.P.: Net gross product = (Profit + Direct Labor Cost). C.L: Invested capital.

Revenue ratio based on production costs: where,

Em.l: Rentability ratio based on production costs. N.P.: Net gross product = (Profit + Direct Labor Cost). TC: Annual production costs.

Results and Discussion

A study of the reality of rainfed barley production in Syria in general, and the Syrian coast in particular, during 2014-2023

Barley is one of the most important crops cultivated in Syria and has significant economic importance. It is part of the human diet, in addition to its importance as a fodder crop. It also outperforms several crops cultivated in arid environments, due to its productivity and tolerance to stressful conditions such as drought and frost. It is cultivated in many governorates across the country with the areas planted with this crop varying from year to year.

Table 2 shows the area planted with rainfed barley, production, and yield in Syria during 2014-2023, with record figures, assuming 2014 is the base year. The annual growth rate was calculated according to the formula:

Where, Y_t: the value for the last year; Y_0: the value for the first year; T: the number of years.

Table 2. Area, production, and yield of rainfed barley in Syria, 2014-2023

Year	Area (ha)	Area Index (%)	Production (t)	Production Index (%)	Yield (kg/ha)	Yield Index (%)
2014	1,167,018	100.0	489,606	100.0	420	100.0
2015	1,058,787	90.7	1,499,707	306.3	1,416	337.1
2016	1,182,033	101.3	829,638	169.4	702	167.1
2017	1,116,515	95.6	861,674	176.0	772	183.8
2018	1,113,038	95.3	247,259	50.5	222	52.8
2019	1,414,193	121.1	2,857,280	583.5	2,020	480.9
2020	1,442,699	123.6	2,082,559	425.3	1,444	343.8
2021	1,387,986	118.9	152,888	31.2	110	26.1
2022	1,062,863	91.0	103,918	21.2	98	23.3
2023	1,195,971	102.4	1,082,356	221.0	905	215.4
Minimum	**1,058,787**	**91.0**	**103,918**	**21.2**	**98**	**23.3**
Maximum	**1,442,699**	**123.6**	**2,857,280**	**583.5**	**2,020**	**480.9**
Increase %	**2.4**		**121**		**115.4**	
Annual Growth Rate (%)	**0.3**		**9.2**		**8.9**	

Source: Ministry of Agriculture and Agrarian Reform, Annual Agricultural Statistical Abstract 2024.

The table reveals clear variations in all three indicators due to the changing climatic and economic conditions. The cultivated area ranged from a minimum of approximately 1.05 million hectares in 2015 to a maximum of more than 1.44 million hectares in 2020, with a relatively weak annual growth rate of 0.3%, indicating relative stability in horizontal expansion. Production, however, witnessed sharp fluctuations, peaking in 2019 at approximately 2.86 million tons, more than five times the base year 2014.

It then declined sharply in 2022 to only about 104,000 tons, the lowest during the period, reflecting the impact of climate factors on production. Yield (average production per hectare) varied significantly from 98 kg/hectare in 2022 to 2,020 kg/hectare in 2019, an annual growth rate of 8.9%. This indicates a significant improvement in productivity in some years due to the availability of suitable conditions or the application of improved agricultural technologies.

It should be noted that significant increases in production and yield do not always correlate with increased area, indicating that productivity has a pivotal role in achieving productivity gains. Furthermore, the sharp fluctuations in these indicators reflect the vulnerability of production to climate change and agricultural investment conditions in Syria.

As for the Syrian coast, Table 3 shows developments in the area planted with rainfed barley, production, and yield for 2014-2023

Table 3. Area, production, and yield of rainfed barley in the Syrian coast, 2014-2023

Year	Area (ha)	Area Index (%)	Production (t)	Production Index (%)	Yield (kg/ha)	Yield Index (%)
2014	720	100.0	652	100.0	2,188	100.0
2015	810	112.5	916	140.5	2,408	110.0
2016	813	112.9	768	117.8	1,972	90.1
2017	858	119.1	970	148.7	2,487	113.6
2018	971	134.8	1,090	167.1	2,291	104.7
2019	793	110.1	968	148.4	2,626	120.0
2020	895	124.3	906	138.9	2,084	95.2
2021	921	127.9	844	129.4	2,045	93.4
2022	750	104.1	780	119.6	2,269	103.7
2023	1,185	164.5	1,122	172.0	1,884	86.1
Minimum	**720**	**100.0**	**652**	**100.0**	**1,884**	**86.1**
Maximum	**1,185**	**164.5**	**1,122**	**172.0**	**2,626**	**120.0**
Increase %	**+64.5**		**+72.0**		**–13.9**	
Annual Growth Rate %	**+5.7**		**+6.2**		**–1.6**	

Source: Ministry of Agriculture and Agrarian Reform, Annual Agricultural Statistical Abstract 2024.

The data reflects a gradual change in areas and a general improvement in production, with clear fluctuations in productivity. Cultivated areas increased by 64.5% from 720 hectares in 2014 to 1,185 hectares in 2023, or an annual growth rate of 5.7%, indicating a growing trend toward horizontal expansion in the cultivation of this crop. Also, production increased from 652 tons to 1,122 tons during the same period, an increase of 72% and an annual growth rate of 6.2%. This reflects that production growth was primarily driven by an increase in the cultivated area rather than an improvement in productivity per hectare. In contrast, yield (productivity per hectare) declined from 2,188 kg/hectare in 2014 to 1,884 kg/hectare in 2023, a decrease of -13.9% and a negative annual growth rate of -1.6%. This decline shows that horizontal expansion was not accompanied by improved production efficiency, and may be due to factors such as declining soil fertility, climate change, or poor efficiency in the use of agricultural inputs and resource management.

Overall, the table shows that increased production on the Syrian coast was a primary result of expanding the cultivated area, underscoring the need to focus on increasing yields through the adoption of improved agricultural technologies and improved input management to ensure production sustainability and efficiency.

2. Descriptive economic analysis of rainfed barley cultivation and production in the Syrian coast

The questionnaire covered the above research sample and included an economic analysis of the dunum planted with rainfed barley over a year. The prevailing market prices for the 2023-24 season were used to determine the cost of materials and wages.

2.1 Structure of production costs for rainfed barley cultivation and production

Investment costs (fixed)

Table 4 shows the total and annual fixed costs per dunum planted with rainfed barley in the Syrian coast. It indicates the investment cost items in terms of number, unit cost, and economic lifetime of each item.

Table 4. Total and annual fixed costs per dunum planted with rainfed barley in the Syrian coast

Fixed Asset	Dunum Requirement / Quantity	Unit Price (SYP)	Total Cost (SYP)	Economic Life (Years)	Annual Cost (SYP/year)	Relative Importance (%)
Threshing Fork (Shaghoub)	1	50,000	50,000	10	5,000	2.69
Backpack Sprayer	1	150,000	150,000	10	15,000	8.06
Land Rent	—	—	150,000	—	150,000	80.58
1. Total	—	—	350,000	—	170,000	—
2. Interest on Invested Capital (9.5%)	—	—	31,500	—	16,150	8.68
Total investment costs (1+2)	—	—	381,500	—	186,150	100.00

Source: Research sample for the 2023-2024 season.

As seen in the table, the costs are distributed between land rent and equipment such as the threshing fork (shaghub) and the backpack pump. Land rent is of paramount importance, accounting for 80.58% of total annual fixed costs, indicating that land costs are the primary factor in fixed production costs. The threshing fork and pump, on the other hand, have a relatively lower cost, representing a combined 10.75%, depreciated over ten years through annual depreciation. Furthermore, interest on invested capital affects annual costs by 9.5%, increasing the total investment costs and adding a financial burden on farmers.

Therefore, it can be concluded that the high cost of land rent may limit the profitability of rainfed barley cultivation in the area, necessitating solutions such as improving land use efficiency or subsidizing rental costs. Effective management of financial resources, particularly capital costs, is also essential to ensure sustainable production and achieve adequate returns for farmers.

(b) Variable costs

Production input costs

Production inputs constitute the backbone of the success of rainfed barley cultivation, as they determine crop quality and cost efficiency. These inputs include seeds, organic and mineral fertilizers, pesticides, as well as packaging and transportation tools.

Table 5 shows the cost items related to the inputs for rainfed barley production on the Syrian coast, indicating the timing of addition or application of each item, the required quantities, unit prices, number of applications, and the annual total of these costs. This systematic arrangement helps achieve tight cost management and increase productivity.

Table 5. Production input costs per dunum planted with rainfed barley in the Syrian coast

Description	Application Timing	Number of Applications	Unit Price (SYP)	Required per Dunum	Total Cost (SYP/year)
Herbicides (Pre-emergence)	15 Jan (after 2.5 months)	1	25,000 SYP/liter	0.25 liter	6,250
Seeds (Rainfed Barley)	1 Nov	1	3,605 SYP/kg	23.6 kg	85,000
Organic Fertilizers	14 Aug	1	100,000 SYP/m³	0.9 m³	90,000
Mineral Fertilizer (Soil – Superphosphate)	5 Oct	1	7,000 SYP/kg	20 kg	140,000
Mineral Fertilizer (Soil – Ammonium Nitrate)	1 Nov, 1 Dec	2	10,000 SYP/kg	6 kg	120,000
Mineral Fertilizer (Soil – Nitrate)	1 Feb	1	16,000 SYP/kg	7 kg	112,000
Foliar Fertilizer (Prosol + Algae + Trace Elements)	1 Mar	1	100+150+125 SYP/g	250+150+100 g	60,000
Foliar Fertilizer (High Potassium)	1 Apr	1	100 SYP/g	300 g	30,000
Pest Control (Pesticides)	15 Jan – 15 Mar	—	—	Seasonal Program	108,000
Burlap Sacks	At harvest	1	5,000 SYP/bag	5 bags (100 kg)	25,000
Nylon Bags	At collection	1	2,000 SYP/bag	25 bags (30 kg)	50,000
Bag Transportation Fees	At transportation	1	2,008.62 SYP/bag	29 bags	58,250
Total	—	—			**884,500**

Source: Research sample for the 2023-2024 season.

As shown, the total cost of production requirements for a dunum of rainfed barley amounted to 884,500 SYP annually, distributed over several main stages. Approximately 75 days after planting, or on January 15th, 0.25 liters of germination inhibitor (6,250 SYP) were added. The season began with sowing 23.6 kg of barley on November 1st at a cost of 85,000 SYP. This was followed on August 14th by adding 0.9 m³ of organic fertilizer (90,000 SYP), then three doses of ground mineral fertilizers between the 5/10th and 1/2nd (20 kg of superphosphate at 140,000 SYP, twice the combined nitrogen at 120,000 SYP, and ammonium nitrate at 112,000 SYP). A pest control program costing 108,000 SYP was then implemented during January–March, before the agricultural year was completed with packaging and transportation costs of jute and nylon bags and transportation fees totaling 133,250 SYP, ensuring complete coverage of all agricultural cycle needs.

Production operations costs

Production operations costs constitute a key component in estimating the total cost of rainfed barley cultivation in the Syrian coast. These operations include all work and services performed during the agricultural season, from land preparation to harvesting and collection. These operations are carried out using a combination of agricultural machinery and direct human labor, with costs varying depending on the type, duration, and frequency of operations.

Table 6 shows the costs of agricultural operations that fall within the annual production cycle for a single dunum planted with rainfed barley in the Syrian coast. These operations represent a set of sequential activities that begin with land preparation and end with harvesting and storing the crop. They include the use of agricultural machinery (such as for plowing, harvesting, and threshing), in addition to the direct labor contribution in the cultivation, fertilization, pest control, packaging, and transportation stages. The costs in the table comprise two main categories: machinery and service costs, and direct labor costs. The number of operations, the time required for each operation, and unit wages are specified, with the aim of providing an accurate and comprehensive picture of the cost burden borne by a unit of cultivated area.

Table 6. Costs of agricultural operations per dunum planted with rainfed barley in the Syrian coastal region

Item/Operation	Number of Workers	Number of Times	Time per Occasion	Unit Wage	Annual Cost (SYP)
Machinery and Services Costs					
Soil plowing (primary and secondary)	—	3	—	75,000 SYP/time	225,000
Harvester rental	—	—	2 hours	75,000 SYP/hour	150,000
Threshing process	—	—	2 hours	50,000 SYP/hour	100,000
Direct Labor Costs					
Herbicide to prevent grass seed germination	1	1	4 hours	3,125 SYP/hour	12,500
Seed planting	2	1	1 hour	3,125 SYP/hour	6,250
Organic fertilization	2	1	3 hours	3,125 SYP/hour	18,750
Mineral fertilization (soil application)	2	2	6 hours	3,125 SYP/hour	75,000
Mineral fertilization (foliar application)	1	2	4 hours	3,125 SYP/hour	25,000
Pest control	1	3	4 hours	3,125 SYP/hour	37,500
Barley ear collection	2	1	3 hours	3,125 SYP/hour	18,750
Transporting ears to study	2	1	1 hour	3,125 SYP/hour	6,250
Filling barley grains (burlap bags)	1	1	1 hour	3,125 SYP/hour	3,125
Filling straw (nylon bags)	1	1	1 work day (8 hrs)	25,000 SYP/day	25,000
Loading and unloading bags	1	2	2.5 hours	3,125 SYP/hour	15,625
Subtotal (Direct Labor)	—	—	—	—	**243,750**
Total Cost of Production Operations	—	—	—	—	**718,750**

Source: Research sample for the 2023-2024 season.

As shown, the costs are divided into machinery and service costs, and direct labor costs. The annual cost of basic and supplementary soil plowing amounted to 225,000 SYP (3 times at 75,000 SYP each), renting a harvester for two hours amounted to 150,000 SYP, and conducting a two-hour threshing process amounted to 100,000 SYP. Direct labor involved the use of weed-seed inhibitors costing 12,500 SYP, planting seeds at 6,250 SYP, organic fertilization at 18,750 SYP, and ground and foliar mineral fertilization at costs of 75,000 SYP and 25,000 SYP, respectively, in addition to pest control at 37,500 SYP. Total direct labor costs amounted to

243,750 SYP, and total production costs were 718,750 SYP. These figures illustrate how costs are distributed between mechanical and manual aspects, helping to accurately determine production costs and analyze the efficiency of agricultural operations.

Table 7 provides a detailed overview of total annual variable costs incurred per dunum planted with rainfed barley in the region. These costs are key indicators for assessing the economic feasibility of production, as they include the costs of production requirements and agricultural operations, in addition to annual miscellaneous expenses. The data are organized to illustrate the relative importance of each cost item within the total costs, helping to analyze the overall cost structure and identify the largest contributor to the production expenditures.

Table 7. Total annual variable costs per dunum planted with rainfed barley in the Syrian coastal region

Item	Annual Cost (SYP)	Relative Importance %
Production Supplies		
Herbicide materials	25,000	1.49
Organic fertilizer	100,000	5.94
Seeds for planting	90,000	5.35
Mineral fertilizers	439,500	26.10
Pest control	105,000	6.24
Hessian sacks	25,000	1.48
Nylon sacks	50,000	2.97
Transportation wages	50,000	2.97
1. Total cost of production supplies	884,500	-
Agricultural operations		
Plowing per dunum	225,000	13.37
Direct labor costs	243,750	14.48
Harvester rental and study fees	250,000	14.85
2. Total cost of agricultural operations	718,750	-
3. Total cost of supplies and operations	1,603,250	-
4. Miscellaneous expenses (5%)	80,162	4.76
5. Total costs (3 + 4)	1,683,412	100.00

Source: Research sample for the 2023-2024 season.

As the table shows, the total annual variable costs per dunum planted with rainfed barley in the Syrian coastal region was 1,683,412 SYP. Production supplies accounted for 884,500 SYP, with mineral fertilizers representing the largest expense (26.10% of the total), followed by pest control (6.24%), and seeds (5.35%). Agricultural operations totaled 718,750 SYP, with harvester rental and study fees being the largest component at 14.85%, followed by direct labor costs (14.48%) and plowing (13.37%). In addition, miscellaneous expenses comprised 5% of the total (80,162 SYP). The data highlight that the largest costs are concentrated in mineral fertilizers and agricultural operations, reflecting their critical role in the production cycle of rainfed barley in the coastal region.

2.2 Revenues from a descriptive economic analysis perspective

The average grain production per dunum planted with rainfed barley in the Syrian coast for the 2023-2024 season was approximately 500 kg/dunum/year, averaging 5,000 SYP per kilogram while average straw production was around 600 kg/dunum/year and averaging 1,800 SYP per kilogram. Therefore, the average revenue per dunum planted with rainfed barley from grain and straw was 3,580,000, derived as follows: (500 x 5000) + (600 x 1800) = 2,500,000 + 1,080,000.

2.3 Calculating the various economic indicators for the rainfed barley production

Studying economic indicators is an essential tool for analyzing the feasibility and financial sustainability of any agricultural activity. In this context, a set of economic indicators related to rainfed barley production in the Syrian coastal region were calculated, based on actual data collected from the studied fields. These indicators contribute to providing a comprehensive picture of the relationship between costs and returns, measuring investment profitability, and resource utilization efficiency. They also allow for a clear assessment of farm performance in terms of capital recovery and return. **Table 8** provides a summary of the most prominent of these indicators, which reflect production performance under prevailing economic and agricultural conditions in the region.

Table 8. Summary of the economic indicators for rainfed barley production in the Syrian coast

Item	Unit of Measurement	Value
Average Annual Revenue (Gross Output)	SYP/Dunum/Year	3,580,000
Average Annual Net Profit	SYP/Dunum/Year	1,551,364
Annual Profit to Revenue Ratio	%	43.3
Payback Period of Invested Capital	Year	1.4
Farm Production Efficiency	-	1.91
Overall Economic Efficiency	-	1.76
Turnover Ratio of Variable Assets	SYP	2.12
Turnover Duration of Variable Assets	Day	172.1
Profitability Ratio Based on Invested Capital	%	69.72
Profitability Ratio Based on Production Costs	%	76.5
Return on Investment Ratio (ROI)	%	80.7
Return on Production Cost Ratio	%	88.5

Source: Research sample and from data from Tables 4, 8 for the 2023-2024 agricultural season.

As the table shows, average annual revenue per dunum was 3,580,000 SYP, while the average annual net profit was 1,551,364 SYP, thus yielding a profit-to-revenue ratio of 43.3% indicating high returns and the viability of the activity. The results also show a relatively short payback period (1.4 years), indicating rapid capital turnover and low risk.

Regarding efficiency, the farm production efficiency (1.91) indicates that every Syrian pound spent on production generated 1.91 Syrian pounds of output, while overall economic efficiency (1.76) reflects the underlying effectiveness of the investment. On the other hand, the variable assets turnover ratio of 2.12 shows revenues exceeding variable costs by more than double, despite the fact that the turnover time of these assets (172.1 days) means that capital remains invested in the production process for nearly half a year.

Profitability and rent ratios were high, confirming the attractiveness of this agricultural activity. The profitability ratio to invested capital reached 69.7%, and 76.5% to total costs. Rent ratios based on capital and costs stood at 80.7% and 88.5%, respectively, reflecting a high level of economic efficiency and return on investment. Taken together, these indicators confirm that rainfed barley cultivation is a profitable economic activity in the study area.

Conclusion

The study revealed that the production and cultivated area of rainfed barley in the Syrian coast recorded a significant increase during 2014–2023, accompanied by positive economic indicators reflecting the investment feasibility of this crop. The average annual net profit per dunum reached approximately 1.5 million SYP, while economic efficiency indicators, such as the profitability ratio, capital recovery speed, and economic efficiency index, exceeded unity, confirming the system’s capacity to generate sustainable returns.

Accordingly, the study recommends that agricultural policies focus on ensuring the timely and affordable provision of essential production inputs (seeds, fertilizers, and pesticides), while promoting horizontal expansion supported by strategies to enhance yield per hectare through modern agricultural technologies and effective resource management. Further, it advises strengthening agricultural research and extension programs to improve production practices and reduce losses, alongside implementing a clear action plan that prioritizes support measures, provides financial incentives or credit facilities for farmers, and monitors performance indicators regularly to maximize economic returns and ensure food security in the region.

Supplementary Materials

None.

Acknowledgments: The authors are grateful to the editorial board of Al-Anbar Iraqi magazine.

References

1. Albihawiya, W. A. B., Aboughandour, M. O. A., & Bousayf, S. A. (2024). An economic and analytical study of the factors affecting the food gap from barley in Libya during the period (2000–2020). *Silphium Journal of Science & Technology*, 5(1), 13–24.
2. Al Fraj, N., Nasser, S., & Al Frijat, N. (2018). Econometric analysis of the cost functions of rain-fed barley in the first, second, and third stability zones (Al-Hasakah Governorate). *Homs University Journal of Engineering Sciences*, 40(1), 121.
3. Ali, M. H., Ali, I. H., & Abdul Karim, N. A. (2011). The economic efficiency of barley farms in Diyala Governorate. *Journal of Economics & Administration*, 60(34), 44–51.
4. Directorate of Agriculture in Lattakia and Tartous. (2024). Agricultural statistics for the 2023–2024 season. Planning and International Cooperation Division, Lattakia, Syria.
5. Esnawy, F. A. M., Abd El Hameed, S. A., Abd El Fatah, W. O., & Shaheen, M. G. I. S. (2021). The economics of production and costs of the barley crop in South Sinai. *Journal of Environmental Sciences*, 50(5), 1–12. https://doi.org/10.21608/JES.2021.182288
6. Fadel, A. A., Abdulhamed, Z. A., & Yousif, Sh. A. (2022). Correlation and genetic path-coefficient analysis for barley under seed rates. *Anbar Journal of Agricultural Sciences*, 20(2), 456–470. https://doi.org/10.32649/ajas.2022.176637
7. FAO. (2011). Agricultural statistics of the Food and Agriculture Organization of the United Nations. Rome. Retrieved from http://www.fao.org/faostat
8. Hamo, W. I. I., & Abd, Z. F. (2025). Efficiency of production resource utilization for barley crop in Nineveh Governorate for the 2022–2023 production season: Al Baaj District. *IOP Conference Series: Earth and Environmental Science*, 1487(1), 012224. https://doi.org/10.1088/1755-1315/1487/1/012224
9. Khaddam, M., & Jahjah, M. (2005). *Agricultural economics*. Dept. of Agricultural Economics, Faculty of Agriculture, Tishreen University, pp. 420–423.
10. Khudr, A., Shallouf, F., & Shuaib, S. (1994). *Foundations of feasibility study for agricultural investment projects*. Omar Al Mukhtar University Publications, Al Bayda, Libya, p. 456.
11. Ma'ruf, H. (2003). *Economic feasibility studies and project evaluation*. Safa Publishing House, Amman, Jordan, p. 289.
12. Ministry of Agriculture and Agrarian Reform. (2023). Annual Agricultural Statistical Abstract. Statistics and Planning Directorate, Damascus, Syria.
13. Remo, A. (2020). Spot diseases survey on barley in northeastern Syria and evaluation of the response of some varieties against spot blotch. *Syrian Journal of Agricultural Research*, 7(1), 395–404.
14. Sahli, I., & Allali, S. (2024). The effect of salt stress on germination in some barley varieties (*Hordeum vulgare L.*) (Master's thesis, Abdelhafid Boussouf University Center – Mila, Institute of Science and Technology, Algeria). University Repository.
15. Saleh, S., Al-Yousef, A., Hakim, M. S., & Shaaban, A. S. A. (2022). Genetic behavior of some grain yield traits in barley genotypes using half-diallel cross. *Syrian Journal of Agricultural Research: Research of the 13th Conference for GCSAR*, 13, 31–50.
16. Takla, O. M. (2022). Economic assessment of the rain-fed barley crop in Salamieh. *Journal of Hama University*, 5(6), 97–110.
17. Thompson, S. K. (2012). *Sampling* (3rd ed.). John Wiley & Sons. https://doi.org/10.1002/9781118162934

مقالة أصيلة

الكفاءة الاقتصادية لإنتاج الشعير البعل في الساحل السوري: دراسة حالة الموسم الزراعي 2023–2024

زياد محمد سرحيل[1*] ، حنين نواف عثمان[2] ، صبا إيهاب جديد[2]

[1]كلية الهندسة الزراعية، جامعة اللاذقية
[2]كلية الاقتصاد، جامعة اللاذقية

البريد الإلكتروني للمراسلة: sarhilziadof@yahoo.com

الخلاصة

هدف البحث إلى دراسة واقع إنتاج الشعير البعلي في سورية عموماً وفي الساحل السوري خصوصاً، وتحليل المؤشرات الاقتصادية المتعلقة بالكفاءة الاقتصادية للمحصول خلال الموسم الزراعي 2023–2024. اعتمد البحث على المنهج الوصفي الاقتصادي التحليلي، وجمعت البيانات الميدانية من خلال استبيان استهدف 360 مزارعاً، تضمن مقابلات شخصية للحصول على البيانات الأولية، ثم تم تفريغها وتحليلها لعرض بنود التكاليف الإنتاجية (ثابتة ومتغيرة) ودراسة أهميتها النسبية، بالإضافة إلى تقييم مؤشرات الكفاءة الاقتصادية مثل معامل الربحية، معدل دوران الأصول المتغيرة، ومؤشرات الكفاءة الاقتصادية. أظهرت النتائج أن متوسط صافي الربح السنوي للدونم بلغ نحو 1.5 مليون ل.س، بينما بلغ معامل الربحية 69.72% مقارنة برأس المال المستثمر و76.5% مقارنة بتكاليف الإنتاج، وبلغ معدل دوران الأصول المتغيرة 2.12، ومؤشر الكفاءة الاقتصادية 1.76، ما يعكس جدوى الاستثمار وكفاءة استخدام الموارد. أوصت الدراسة بتحسين توافر المدخلات الإنتاجية، تشجيع التوسع الأفقي مع رفع الغلة لكل هكتار باستخدام تقنيات زراعية محسنة، ودعم البحث العلمي والإرشاد الزراعي، مع وضع خطة تنفيذية واضحة لرصد مؤشرات الأداء وتعظيم الفوائد الاقتصادية والأمن الغذائي

الكلمات المفتاحية: تكاليف الإنتاج، معامل الربحية، فترة استرداد رأس المال، كفاءة استثمار الموارد