

The economic feasibility of cultivating local cucumbers (*Cucumis milo var. flexuosus*) in plastic house

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Abstract

Cucumber (*Cucumis sativa* L.), is widely cultivated under protected condition. The summer local cucumber variety (*Cucumis milo var. flexuosus*) did not previously subjected to protected cultivation. This variety was cultivated in a plastic house, for the first time in Iraq, with an area of 504 square meters, to show the possibility of success of this cultivation, and to calculate its economic feasibility. The study was conducted in one of the plastic house belonging to the College of Agriculture, Al-Qasim Green University, during the fall season 2020. The results of the study showed the success of cultivating this variety in the plastic house in winter. Cost and returns analysis indicates that the cost and profit of this cultivation turned out to be (1746, 3039) thousand dinar respectively. The returns, profit, benefit-cost ratio, rate of return ratio, and operating ratio indicated that local cucumber cultivation in plastic house was profitable. The study recommends the expansion of cultivation of this summer variety in the plastic house in winter.

Keywords: fixed cost; gross margin; net return; profitability; variable cost.

Introduction

Cucumber (*Cucumis sativa* L.), is one of the most important vegetables widely cultivation in the world (Lao et al., 2023). It is ranked 10th among the most important vegetable crops worldwide (Sallam et al., 2021). Cucumber is a rich source of vitamins, minerals, and antioxidants (Patel and Panigrahi, 2019), it is often eaten both fresh, e.g., in salads, and processed or preserved, e.g., as pickles (Obel et al., 2022).

In order to ensure an increase in agricultural production and productivity and the efficient use of resources, the world has turned towards protected agriculture. The advantages of protected cultivation include: a decrease in yield loss resulting from extreme weather, protection against pests, weeds and diseases, the more efficient use of productive resources, improvement in crop quantity and quality, and

increasing farmers' incomes (Ummyiah et al., 2017).

Some recent studies have done to determine the economics of cucumber cultivation under protected condition (Sanjeev et al., 2015; Adeoye B., Olubunmi; Diab et al., 2016; Elum et al., 2016; Kumar et al., 2017; Malik, 2017; Mohamed and EL-Nagger, 2018; Al Rawahy and Mbaga, 2019; Ülviye et al., 2019; Kowalczyk et al., 2020; Tarek et al., 2020; Orlando et al., 2021), and it was found that protected cucumber production was profitable, costs of labor and marketing were the highest among production costs respectively.

Cucumber is widely cultivated in Iraq, the area cultivated in 2021 was 21000 hectare, producing 185484 ton, it comes third after tomato and water melon for cultivated area

and production of vegetables crops on Iraq (CSO,2021a).__Among the varieties of cucumbers growing in Iraq, there is a local summer variety (*Cucumis milo var.flexuosus*) known as cucumber Armenian (ALkethaa), which is often cultivated under open cultivation conditions. Area cultivated with this variety constitutes 28.7 % of the area cultivated with cucumbers, while the production constitutes 29% of Iraq's production of cucumber(CSO, 2021b).

This summer variety of cucumber is characterized by its tolerance to high temperatures and lack of irrigation water, therefore, the Iraqi farmer did not try to grow this variety under protected cultivation conditions in winter. This study was the first attempt in Iraq to cultivate this variety in plastic house. However, what are the chances of success in cultivating this variety in plastic houses in the winter, and what is the economic feasibility achieved from this cultivation? This is what the study is trying to answer.

This study undertaken to estimate costs and return of local summer cucumber cultivation in plastic house and determine profit measures of this cultivation.

Materials and methods

The study was conducted in one of the plastic house belonging to the College of Agriculture, Al-Qasim Green University, Babylon province, located between 32° and 33.25° North latitude and 44°to 45° East longitude, during the fall season 2020 on 1/10/2020. The area of this house is 504 square meters, which include 5 terraces, soil covered with mulch , seeds were planted directly in a hole on both sides, the distance between hole and another was 0.40 m, with a drip irrigation system.

Data related to costs of cucumber production [included; soil preparation costs, drip irrigation pipes costs; mulch costs; plastic house cover costs; materials costs (seed, fertilizers, pesticides, herbicides); labor costs (land preparation, sowing, fertilizer application, pesticides, and herbicides

application, weeding, watering and harvesting), irrigation costs(water pumping); marketing costs (packing and transportation)], the marketed quantities of cucumber and the price received, have been recorded ..

Data collected were analyzed using economic indices like total cost, gross return, the profit, Cost-Benefit ratio, rate of Return Ratio, and operating ratio were calculated by using relevant equations analysis (Gittinger, 1982; Boardman et al., 2018)

Cost of production: was taken into account by calculating total expenditure on labor, fertilizers, seeds, tillage, plant protection, irrigation, and marketing.

Gross return: were calculated by multiplying the yield of cucumber with the price that the seller receives when he sale the yield.

Profit = total costs - total returns.

Cost-Benefit ratio = returns/ cost.(is a relative measure that is used to compare benefits per unit of cost. It helps analyze the financial efficiency of the producer (when it is greater than 1, the enterprise is profitable. Otherwise, it is not profitable)

Rate of Return Ratio = profit/ cost. (represents the financial empowerment for a further business venture and vice versa. It represents the return of cash to the business).

The operating ratio= cost/return. (used to estimate the relative expenditure structure in the cucumber farming business, if it was lower than 1, it is profitable to invest in the project, the lower the ratio, the higher the profit).

Results and Discussion

Cost of cucumber Production

The particulars related to plastic house cucumber cultivation are listed in Table 1. The total cost were determined to be 1746 thousand dinar for 504 square meter. Labor cost accounted for the highest percent of total cost of production (43%),labor cost is the highest in plastic house vegetable cultivation in generally and cucumber in particular (Diab et al., 2016; Athearn et al., 2018 ;Al Rawahy and Mbaga, 2019; Ülviye et al., 2019; Cowalczykc et al., 2020; Zhang et al., 2022).

Marketing costs were ranked second and constituted (11.5%) of total cucumber production costs. Yield marketed at local or wholesale markets after packing in plastic boxes or bags, marketing costs include the price of bags or boxes, plus the cost for transporting the yield to the market. Some

resent studies found that marketing cost comes second among costs of vegetable production (kshash and oda, 2022a; kshash and oda, 2022b; Lutfu et al., 2018; Duhan, 2016).

Other major component costs were irrigation, plastic house cover, pesticides, fertilizer, drip irrigation pipes, mulch, seed, and rope.

Table 1. Cost of cucumber cultivation per plastic house (504 m²).

Particular	Cost(thousand dinar)	%
Soil preparation	100	5.7
drip irrigation pipes	72	4.1
mulch	36	2.1
plastic house cover	144	8.2
seed	18	1.0
fertilizers	120	6.9
pesticides	144	8.2
Ropes	12	0.7
Labor	750	43.0
Irrigation	150	8.6
Marketing	200	11.5
Total costs	1746	100

Returns of cucumber Production

The total yield of cucumber was 4357 kg (Table 2). This amount of yield is considered small compared to what studies have indicated (Alsadon et al., 2016; Kumar et al., 2017), but it is considered a good result as it is the first attempt to cultivate this variety in plastic house. With a selling price of one thousand dinar/kg , the total returns is 4357 thousand dinar. Accordingly, the total profit

achieved from cultivating cucumbers in a plastic house of 504 square meters amounted to 3039 thousand dinars. Cucumber cultivation in plastic house was profitable, the benefit-cost ratio was 2.49, it is greater than 1, which indicated that cucumber cultivation provides a return on investment. The rate of return ratio(1.74), and operating ratio (0.400) of cucumber production indicated production of local cucumber in plastic house was profitable.

Table 2. Returns and profit of cucumber production per plastic house (504 m²).

Economic factors	Amount
Yield (kg)	4357
Sale price(thousand dinar /kg)	1
Returns (thousand dinar)	4357
Costs (thousand dinar)	1746
Profit (thousand dinar)	3039
Cost-Benefit ratio	2.49
Rate of Return Ratio	1.74
Operating ratio	0.400

Conclusion and Recommendations

The cultivation of local cucumbers in the plastic house, as a first experiment in Iraq, proved successful, gave a good amount of yield and made a good profit as a result of a high selling price due to the cultivation of the crop in the winter season. The returns, profit, benefit-cost ratio, rate of return ratio, and operating ratio indicated that local cucumber cultivation in plastic house was profitable and suitable for doubling farmer's income. The study recommends working on urging farmers to cultivate this summer variety in the plastic house, in winter, to ensure the availability of the crop and increase the return.

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