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Impact of the irrigation method on the comparative advantage of wheat production in Iraq for the season 2023-2024 (Anbar Governorate as a case study)*

Researcher: Ahmad Abdul Sattar Najam[1] **Prof. Dr. Mashal Abdul Khalaf**[2]
Ahm231002@uoanbar.edu.iq ag.mishal.abid@uoanbar.edu.iq
University of Anbar – College of Agriculture[1, 2]

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Abstract:

The Iraqi government has given great importance to the wheat crop and singled it out for support programs more than other crops because of its link to food security, and despite the attention paid to the wheat crop, the costs of wheat production in sweat are still high. Therefore, the study aimed to study the impact of the irrigation method on the comparative advantage of wheat production in Anbar province based on the method of analyzing the agricultural policy matrix according to the irrigation system. This is based on data collected from samples of wheat farmers under different irrigation systems to prepare the farm budget and then the elements of the policy analysis matrix that are used to calculate agricultural policy indicators. She pointed out that the wheat cultivation system is supported in terms of production and inputs. The effective protection coefficients were 1.97 for pivot sprinkler, 1.92 for stationary sprinkler and 1.98 for conventional irrigation. The local resource cost factor of 0.71 for pivot sprinkler indicated 0.93 for fixed sprinkler and 1.29 for conventional irrigation. Pivotal spraying has a greater comparative advantage than fixed spraying, while wheat production under conventional irrigation in Anbar does not have a relative balance. Therefore, it is necessary to switch to wheat production under axial spraying.

Keywords: technical transactions, farm budget, policy analysis matrix protection indicators, comparative advantage.

* البحث مستل من رسالة ماجستير.

اثر طريقة الري على الميزة النسبية لانتاج القمح في العراق للموسم 2023-2024 (محافظة الانبار انموذج دراسي)

الباحث: احمد عبد الستار نجم[1] أ. د. مشعل عبد خلف[2]

جامعة الانبار – كلية الزراعة[1، 2]

الملخص:

ان الحكومة العراقية اولت محصول القمح اهمية كبيرة وخصته ببرامج الدعم اكثر من غيره من المحاصيل الاخرى لارتباطه بالأمن الغذائي، ورغم الاهتمام الذي خص محصول القمح فلازالت تكاليف انتاج القمح في العراق مرتفعة. لذلك استهدفت الدراسة دراسة اثر طريقة الري على الميزة النسبية لإنتاج القمح في محافظة الانبار بالاعتماد على اسلوب تحليل مصفوفة السياسة الزراعية بحسب نظام الري. وذلك بالاعتماد على بيانات تم جمعها من عينات من مزارعي القمح تحت انظمة ري مختلفة لإعداد ميزانية المزرعة ومن ثم عناصر مصفوفة تحليل السياسة والتي تستخدم لاحتساب مؤشرات السياسة الزراعية. والتي اشارت الى ان نظام زراعة القمح يحظى بدعم في جانب الانتاج ومدخلاته. اذ بلغت معاملات الحماية الفعالة قيم 1.97 للرش المحوري و 1.92 للرش الثابت و 1.98 للري التقليدي. واشار معامل كلفة المورد المحلي البالغ 0.71 للرش المحوري 0.93 للرش الثابت و 1.29 للري التقليدي. الى امتلاك الرش المحوري ميزة نسبية افضل من الرش الثابت بينما لا يمتلك انتاج القمح تحت الري التقليدي في الانبار ميزة نسبية. لذلك فمن الضروري التحول الى انتاج القمح تحت الرش المحوري.

الكلمات المفتاحية: المعاملات الفنية، ميزانية المزرعة، مصفوفة تحليل السياسة، مؤشرات الحماية، الميزة النسبية.

Introduction

Iraq is suffering from a deterioration of water resources, which leads to the exacerbation of the problem of water scarcity, including the lack of water supply due to the behavior of neighboring countries on the one hand and the decline in rainfall on the other. Water scarcity in Iraq may be one of the most important determinants and a serious problem that Iraqis will face in the future, which will be a decisive factor in agricultural activity shortly.

The wheat crop is one of the pillars of food security for any country, and the political and economic instability that the world has been witnessing in recent years gives great importance to the local production of the wheat crop and its role in acceptably achieving stable food security, and that the production of wheat in Iraq in irrigated agriculture constitutes about 70% of the domestic product of the crop(1). Therefore, the Iraqi government has focused on supporting the overall crop production system. And the increasing area planted with wheat in Iraq.

The factors referred to above necessitate the Iraqi governments to find solutions to the problem of water, especially used in agriculture, which constitutes one of the main economic activities in Iraq, which accounts for more than 70% (2), and that cereals in general and wheat in particular rank first in their share of fresh water from water imports (3). Many government agencies and private organizations in Iraq have developed special programs to encourage farmers to use modern irrigation methods. Since there are several methods of irrigation, it is necessary to compare these methods and determine the impact of each of them on the comparative advantage of agricultural production in general and the production of major crops in particular, of which wheat is one of the most important crops[4].

Therefore, the research aimed to analyze the impact of the irrigation method on the comparative advantage of wheat cultivation in Iraq (Anbar province asa study model), using a policy analysis matrix, protection indicators and the comparative advantage of wheat production, and the importance of this research lies in testing the impact of using modern irrigation methods on the comparative advantage of crop production and that the contribution of this research is concentrated In evaluating the program of using modern irrigation systems in agriculture and their impact on crop productivity, production costs and economic water use efficiency.

Materials and methods of work

The analysis of the returns and costs of wheat production under different irrigation systems at private and social prices provides information and indicators that help the policy maker to reduce social costs, and help him choose the irrigation system that has a higher degree of competitiveness and a better comparative advantage that enables him to continue. Such an analysis

requires the preparation of a budget for the farm under each irrigation system at special prices and social prices.

The preparation of a realistic farm budget simulates the reality of crop production and requires realistic data from the farmers of the area concerned(5). A distinction must be made between tradable and local production inputs in the preparation of technical transactions as well as the farm budget. Therefore, the research relied on data obtained from a selected sample among the wheat farmers in Anbar, who are distinguished according to the data of the agricultural divisions and according to the approved irrigation system. The information required in this form provides the technical transactions used on their farms. And the costs they incurred to be used to prepare the farm budget according to irrigation systems, which are used to calculate the elements of the policy analysis matrix.

Policy Analysis Matrix (PAM): The policy analysis matrix is used to compare the economic costs and benefits of different projects. This matrix evaluates projects using the current market price (special price) and a price that reflects the real costs and benefits of the community (social price). The difference between these two prices is called conversion, and it measures the impact of .government policies on resource efficiency

Production inputs are divided into tradable inputs (which can be traded with foreign markets) and non-current inputs (such as natural resources). By comparing costs using the local price or the special price borne by the producer and the social price, we can identify the distortions caused by government policies in the markets(6). This matrix consists of three rows and four columns(7), and the elements of the agricultural policy matrix are extracted from the technical transactions of the agricultural crop system, which may change with the change of the pattern or method of production or irrigation method and table (1) shows the general form of the policy analysis matrix.

Table (1) Policy Analysis Matrix Structure

	Revenue	Tradable Inputs	Domestic Resources	Profits
Private Price	A	B	C	D
Social Price	And	F	G	H
Differences	I	J	K	L

The first column represents revenues and their transfers, the second column shows the costs of tradable production inputs and their transfers resulting from government intervention, and the third column represents the costs of local resources at private and social prices and their transfers resulting from government intervention. While the fourth column represents profits at special prices, social prices, and net transfers [8]. Which can be reviewed as rows also as follows:

First row: Displays the economic values of the system when market prices (special prices) are used, including gross revenue (A), tradable input costs (B), cost of local resources (C), and profits (D) = A- (B+C)[9].

Second grade: presents the same economic values, but using social prices (shadow prices) that reflect the real costs and benefits to society, including social revenues (E), costs of social inputs (F), cost of social domestic resources (G), and social profits (H) = E-(F+G)[10].

Third row: Illustrates the impact of government policies and market distortions on the system, by comparing values in the first and second row, and shows changes in revenues, costs, and profits resulting from these policies and distortions, and output transfers[11].

Whereas, the representation of the previous values is carried out according to the following laws:

1- Revenue transfers: It is the difference betweenhe value ofproduction at the local market price and its value at the social price.

I = A – E

2- Transfers of traded input costs : It is the difference between the cost of .traded inputs at the local market price and their cost at the social price

J = B – F

3- Local resource transfers: It is the difference between the prices of local .resources at the local market price and their social price

K = C – G

4- Net transfers: represent the effects of government intervention and market failure on the commodity system

L = I – J – K

From it, we can calculate the profit function according to the following formula:

$$Profit = e * p_q * Q - e * p_t * I_t + p_n * I_n + X$$

e = exchange rate of the local currency.
p_q = Product price
p_t= price of traded inputs
p_n= Price of non-traded inputs (local resources)
Q= Production quantity
I_t= Amount of traded input
I_n= Quantity of non-traded input (local inbound)
X = costs of the influence of some indirect factors (external factors) such as lack of information, monopoly, backward production methods, and risk.

Uses of the Policy Analysis Matrix: The Policy Analysis Matrix is used to analyze the impact of government intervention on a specific commodity system, and it can also be used to compare two different commodity systems and determine which one has a greater comparative advantage and competitiveness. It is also used to compare different production methods for the same commodity to determine which methods are best in terms of the comparative advantage achieved by the system under that method(12).

Determinants of policy matrix transactions: An analysis matrix is affected by several factors that control it and affect its results in terms of continuity, and the exchange rate, social rate and shadow rate are the most important factors in determining the accuracy and objectivity of the results(13).

Exchange rate: The exchange rate occupies great importance in the analysis of economic policies, especially when comparing local prices with international prices. The exchange rate is defined as: the relative value of a country's currency compared to the currencies of other countries and plays a crucial role in international trade.

Social price: Social prices are prices that reflect the real costs and benefits of production and consumption, including environmental and social costs. It represents the value of a product or supplier globally adjusted at the local currency exchange rate. The standard conversion factor (F.C.S.) is used to correct distortions in exchange rates. When the government intervenes in determining the exchange rate, it may lead to unrealistic exchange rates that do not reflect real market forces(14).

Shadow Price: These are hypothetical prices used to evaluate resources that are not traded in local markets. Shadow prices are calculated based on the

alternative costs of using resources[15], the value that can be obtained from using these resources in the best alternative use of them[16].

Policy matrix analysis indicators : - There are a large number of indicators that are calculated from the elements of the policy analysis matrix, which can be used to judge the effectiveness of the government intervention policy in the commodity system and its impact on the goals that were drawn and on the parties of the production system of producers, consumers and society and Table No. (2) shows the most important of these indicators and the method of calculating them from the elements of the policy analysis matrix and the limits that show that they have achieved the desired significance of the intervention[17].

Table (2) Formulas for calculating and indications of agricultural policy analysis indicators

Significance	Possibilities	Appreciation	modulus
The local price of the crop is higher than the global price, and this means subsidizing the product and the .consumer bearing higher prices with protection	1<	$\frac{A}{E}$	Nominal protection of outputs**(NPCO)**
The local price of the crop is lower than the global price, which means that the producer bears indirect .taxes and consumer support	1>		
It describes the state of equality between producers and consumers, which means that there is no deviation or price imbalance, and there is no government intervention.	1=		
The local price of the input is higher than its global .price, which means the product incurs indirect taxes	1<	$\frac{B}{F}$	Nominal input protection **(NPCI)**
The local price of the input is lower than the global price, which means the country subsidizes the product	1>		
The absence of an imbalance in price policy.	1=		
Producers receive greater returns on their resources and this means that there is support for them (positive .(protection	1<	$\frac{A-B}{E-F}$	**Effective protection** Value Added **(EPC)**
Producers receive lower returns on their resources, meaning there are taxes on Producers (negative protection)	1>		
This means having a neutral policy.	1=		

The state does not have a comparative advantage in the production of the crop compared to importing it from abroad It reflects the relatively low efficiency in the use of .available resources to produce the crop or commodity	1<	$\frac{G}{E-F}$	**Cost of local resources** Comparative advantage (DRC)
The state enjoys a comparative advantage in crop production, i.e. the presence of efficiency in the use of local natural productive resources available in the .production of the crop or commodity	1>		
It reflects a equilibrium position or break-even point, and here the trend towards local production in order to increase the employment process and increase the percentage of self-sufficiency	1=		
Increasing the cost of production inputs after the trend of liberalization of foreign trade	1<	$\frac{L}{E}$	Product subsidy rate **(PSR)**
The decrease in the cost of production inputs after the trend of foreign trade liberalization	1>		
This means having a neutral policy.	1=		
Value added is less expensive than its alternative opportunity, i.e. indicates the poor efficiency of .domestic resources	1<	$\frac{D}{H}$	Profitability Coefficient **(PPC)**
,The value added is greater than the opportunity cost indicating an increase in the efficiency of domestic resources	1>		
.The added value is equal to the cost of local resources	1=		

Since the wheat crop can be grown under different irrigation methods in order to measure the efficiency of those methods on the one hand, as well as extracting the elements of the policy analysis matrix through another matrix to analyze the impact of the irrigation method on the technical, financial and economic aspects which were used to extract technical standards in addition to economic standards. This requires the preparation of a secondary matrix whose components are used to calculate additional indicators of the irrigation method used(18).

Results and discussion

The technical transactions used in wheat farms were used to prepare the farm budget and according to the nature of the resources used in production as traded or local resources and at special prices and social prices, to be used

in calculating the elements of the agricultural policy analysis matrix, and Table (3) shows the technical coefficients necessary for wheat acres and according to the irrigation system and the type of inputs.

Table (3) Technical Transactions of Cultivated Wheat Dunum by Irrigation Method in Sample Farms for the Season 2023-2024

Entrance utilization rate in dunums or entrance cost per dunum			**Production Elements**	**Input Type**
Static spraying	**Axial spray**	Conventional **irrigation**		
41	40	45.4	Seeds kg	**Traded inputs**
46	45.38	38.26	Urea fertilizer kg	
50	46	43.42	Compound fertilizer kg	
0.15	0.1	0.05	Liquid fertilizer (liter)	
0.33	0.33	0.25	Broad-liter pesticides	
0.75	0.58	0.5	Liter thin pesticides	
2.5	20.5	15	Liter kerosene	
1	1.5	1.25	Gasoline liters	
0.25	1.75	1.5	Liter oils	
11K	13.25K	12.5K	Spare tools Alf	
1	1	1	The land is a dunum	**Local input**
750	640	580	Capital **1000**	
500	240	300	Fixed assets thousand	
4	3.2	4.25	Mechanical work watch	
2.5	1.25	2.6	Manual work day	
210	150	110	Electric power KW/dunum	
1375	1344	1750	/Irrigation water m^3/ dunum	
1042	996	825	Productivity per dunum kg / dunum	
8	10	20	The value of other products in thousands	

Source: Preparation I demand to rely on the data of the forms of Al Ain farmers.

Farm budget: The farm budget provides a presentation of the production costs borne by the wheat producer to cultivate a wheat dunum and the revenues it can achieve. The farm budget represents a translation of the technical transactions, and according to the special prices borne by the producer and those social costs expressed in international prices or shadow prices, and Table No. (4) shows the budgets of the dunum of wheat planted according to the different irrigation systems and the type of costs

Table (4) Budget of dunum wheat cultivation under any irrigation methods at private and social prices for the 2023-2024 seasons

Fixed spraying		Pivot springing		Conventional irrigation		Production element	Entrance Type
Social prices	At special prices	Social prices	At special prices	Social prices	At special prices		
36	30	41.04	22	41.04	29.5	Seeds kg	Traduple inputs
51.2	33.12	45.9	31.766	45.9	27.54	Urea fertilizer kg	
75	60	65.13	50.6	65.13	52.104	Compound fertilizer kg	
3	2.25	1.5	1.5	1	1	Liquid fertilizer (liter)	
8.25	3.3	6.25	2.64	6.25	2.5	Broad-liter pesticides	
11.625	9	7.5	5.8	7.5	2	Liter thin pesticides	
3.125	1.25	11.25	9.225	11.25	7.5	Liter kerosene	
0.4	0.25	1	0.75	1	0.625	Gasoline liters	
0.75	0.5	4.5	4.375	4.5	3	Liter oils	
11	11	13.75	13.75	12.5	12.5	Spare tools Alf	
201.45	140.32	197.82	142.406	163.87	138.27		
45	25	10	5	45	35	Land Dunam (rent)	Local input
51.2	38.4	51.2	32	46.4	29	Capital (interest) thousand	
24	24	14.4	24	30	30	Fixed assets (extinction) A	
57.6	52.7	57.6	48	76.5	76.5	Mechanical work watch	
62.5	45	37.5	22.5	65	46.8	Manual work day	
4.5	2.25	4.5	1.8	3.3	1.32	Electric power KW/dunum	
33.5	-	33.6	-	43.75	-	Irrigation water m3/dunum	
278.3	187.35	208.8	133.3	309.95	218.62	Total	
479.75	325.72	406.62	275.706	473.82	356.9	Total Total Costs	
509.5	729.4	487.24	717.12	403.2	594	Productivity per dunum in kg	

5	5	5	5	20	20	Value of waste
514.5	734.4	492.24	723.12	423.2	614	Total Revenue

Source: Student preparation based on sample farmer forms data.

1- **Policy Analysis Matrix for Conventional Irrigation Farms:-** The Policy Analysis Matrix for Conventional Irrigation Farms provides a summary of the budget of conventional irrigation farms. It consists of three rows, the first row is devoted to presenting a summary of the budget of the dunum planted under traditional irrigation at special prices, while the second row summarizes the budget of the dunam planted under traditional irrigation at social prices, and the third row of the policy analysis matrix under traditional irrigation is devoted to knowing the impact of the intervention policy on the wheat crop system in the field of production and in Both the traded as well as local inputs and the summary of the result of the intervention policy on the commodity system and Table (5) shows the elements of the policy analysis matrix for conventional irrigation farms.

Table (5) Policy Analysis Matrix for Dunum Cultivated under Conventional Irrigation for 2023-2024 Seasons.

Type of price	Reveneues	Value of Input		Profits
		Tradeable inputs	Non-tradable input Local Resources	
In Private price	614	138.27	218.62	257.11
In Social price	403.6	163.87	309.95	-70.62
Transfers	210.8	25.6-	-91.33	327.93

Source: Calculated from the farm budget for traditional irrigation.

It is clear from Table (5) that the dunum planted under Conventional irrigation in Anbar province achieved returns at special prices higher than the parallel returns at social prices, which means that the policy of government intervention in the pricing of the wheat crop was in favor of the wheat producer in Iraq, as the farmer according to this system achieved transfers of 210.8 thousand dinars from the dunum planted under traditional irrigation due to the pricing of the wheat crop output. As for the value of tradable inputs used for wheat acres under conventional irrigation, it reached Its value 138.27 thousand dinars, which is less than the value of those inputs at social prices, which indicates the positive impact of the intervention policy on the wheat production system, to the dunum planted under traditional irrigation amounted to 25.6 thousand dinars, transfers in local resources amounted about 91

thousand dinars for the dunum planted. The policy analysis matrix for dunams planted under conventional irrigation showed that the policy adopted by the state made the costs of local inputs at private prices also lower than those of social prices by 91.33 thousand dinars. This means that the interventionist policy in the wheat production system has positive effects on both revenues and costs.

It is clear from Table (5) that the farmer who grows wheat under traditional irrigation was able to achieve a profit from the dunam estimated at private prices of about 257 thousand dinars, but this profit declines in social prices to turn into a loss of about 71 thousand dinars per acre. However, the net impact of the interventionist policy on the wheat crop system was positive for the farmer and achieved a total net transfer of about 328,000 dinars. This indicates the determination of the Iraqi government to support Wheat farmers in the field of product prices as well as in the field of input prices.

2- **Policy Analysis Matrix under Pivot Sprinkler Irrigation:** - The policy analysis matrix for pivot sprinkler irrigation farms can be obtained from summarizing the farm budget for the dunam planted under pivot sprinkler irrigation, as the elements of the first row are obtained at prices to summarize the budget of the dunam at special prices, while the elements of the second row are obtained from the farm budget at social prices, while we get the elements of the transfer row from subtracting the value of the element at special prices minus the corresponding row in the social prices row, Table (6) shows the elements of the policy analysis matrix for the dunum planted under pivot sprinkler irrigation.

Table (6) Policy Analysis Matrix for dunum planted under pivot Spraying for 2023-2024 seasons

Type of price	Reveneues	Value of Input		Profits
		Tradeable input	Non-tradable input Local Resources	
In Private price	723.12	142.406	133.3	447.414
In Social price	492.24	197.82	208.8	85.62
Transfers	230.64	55.414-	-75.5	361.8

Source: Calculated from the farm budget for pivot springing irrigation.

It is clear from Table (6) that wheat farmers under pivot sprinkler irrigation receive transfers due to the production price subsidy of about 231

thousand dinars per acre, and they receive transfers as a result of subsidizing the price of traded production inputs by 55.4 thousand dinars, while the value of the facilities granted by the state to invest local resources in the cultivation of wheat crop is about 75.5 thousand dinars per acre. We can also note that the dunum planted with wheat crop in the study sample achieved a special profit for the farmer estimated at 447 thousand dinars, while the social profit of the dunum was about 85.6 thousand dinars, and it was found that the net total transfers of the dunam planted under axial spraying in the study sample amounted to 361.8 thousand dinars.

3- **Policy Analysis Matrix under Fixed Sprinkler Irrigation**: - The policy analysis matrix for fixed sprinkler irrigation farms, obtained from summarizing the farm budget for the dunum planted under fixed sprinkler, as the elements of the first row were obtained at prices to summarize the dunum budget at special prices, while the elements of the second row were obtained from the farm budget at social prices, while the elements of the transfer row were obtained from subtracting the value of the element at special prices minus the corresponding element in the social prices row, and the table No. (7) shows the elements of the policy analysis matrix for the dunam planted under the constant sprinkler.

Table (7) Policy Analysis Matrix for dunum Planted of wheat under fixed spraying for the 2023-2024 seasons

Type of price	Reveneues	Value of Input		Profits
		Tradeable inputs	Non-tradable input Local Resources	
In Private price	729.4	140.32	187.35	401.73
In Social price	509.5	201.45	287.3	20.75
Transfers	219.9	61.13-	-99.95	380.98

Source: Calculated from the farm budget for Fixed Sprinkler irrigation.

It is clear from Table (7) that wheat farmers under constant sprinkler irrigation in the study sample have obtained transfers due to government intervention in the production price of about 220 thousand dinars per acre, while the transfers obtained as a result of subsidizing the price of traded production inputs amounted to about 61 thousand dinars per dunum planted under fixed sprinkling, while the value of the facilities granted by the state to invest local resources in the cultivation of wheat under fixed spraying amounted to about 100 thousand dinars. for an acre.

We can also note that the dunam planted with wheat crop in the study sample of irrigation farmers by fixed sprinkler among the distinguished farmers has achieved a special profit per dunum estimated at about 401 thousand dinars per acre, while the social profit of the dunum decreased by about 21 thousand dinars only, and it was found that the net total transfers of the dunam planted under pivot spraying in the study sample amounted to an amount of 380 thousand dinars per acre. Protection indicators and comparative advantage of wheat producers under different irrigation systems:

The indicators of protection, comparative advantage, and competitiveness of the production system of any commodity are among the basic indicators on which to determine the impact of the policy based on the producer, consumer and society in the system of the commodity concerned. These indicators were calculated according to the mathematical formulas that were presented in the work methods and according to the approved irrigation method and according to the elements of the agricultural policy analysis matrix that were calculated according to the approved irrigation methods and Table (8) shows the values of these indicators.

Table (8) Protection Indicators and Comparative Advantage of Wheat Farms by Irrigation Method for the Year 2023-2024 in Anbar Governorate

Conventional Irrigation	Fixed spraying	Pivot spraying	Formula	Icon	**Pointer**
1.52	1.43	1.46	A/E	NPCO	Nominal protection coefficient of production
0.84	0.69	0.72	B/F	NPCI	Nominal protection coefficient for output inputs
1.98	1.91	1.97	(A-B)/(E-F)	NPC	Effective protection factor
1.29	0.93	0.709	G/(E-F)	DRC	Advantage factor ratio (cost of (local resources
0.46	0.32	0.23	C/(A-B)	FCB	Percentage of own costs
-3.64	19.4	5.22	D/H	PC	Profitability coefficient

	1.22	0.909	(F+G)/D(	SCP	Cost coefficient at social prices
81	78	73	(L/E)*100	PSR	Product subsidy rate
53	42	50	(L/A)*100	ESP	Product Support Equivalent Coefficient

Source: Calculated by the researcher using the policy analysis matrix.

It is noted from Table (8) that the protection factors for the wheat crop in Iraq were indicating the existence of real support for both the product and the production resources used in wheat production, as the effective protection factor reached values of 1.97, 1.91 and 1.98 for each of the pivotal, fixed and conventional spraying respectively. The local resource cost coefficient, whose value in pivot spraying was 0.71, which is less than one is true, which indicates the ownership of the wheat production system under pivot spraying in the province of Iraqi Anbar has a comparative advantage. It also amounted to about 0.93 for the fixed sprinkler system, which is less than one, and the possession of the fixed sprinkler system indicates a comparative advantage, but it is less than the pivot spraying. The cost factor of the local resource under conventional irrigation was 1.29, which indicates that the wheat production system under conventional irrigation does not have a comparative advantage.

The coefficient of the percentage of special costs, which amounted to less than one Sahih, also indicated the ability of wheat production systems to compete under the current conditions and in the presence of government support and the distinction of pivot sprinkler irrigation by its superiority in the ability of wheat produced under it to compete compared to other irrigation systems. It was found that the private profits achieved for the wheat product under pivotal spraying are equivalent to five times its profit without government intervention, while the profits of wheat producers under fixed spraying are equivalent to about 20 times its profits if the government abandons interference in the wheat production system in Iraq. The product subsidy equivalent coefficient indicates that wheat producers receive subsidies on the production price side, representing 50% in pivot spraying, 42% in fixed spraying, and up to 53% in conventional irrigation.

Conclusion

1- The technical transactions showed that the method of irrigation by pivot sprinkler used less water per dunum than other methods, as the amount of water for traditional spraying required for the dunum planted with wheat reached 1750 m^3 and decreased to 1375 m 3 for the dunum of wheat under fixed spraying and amounted to 1344 m 3 for the acre of pivot spraying. Therefore, we recommend adopting the pivot spraying method to reduce the amount of water needed to irrigate the wheat crop and expand the cultivated area.

2- The protection factors indicated that the wheat production system in Iraq is supported on the production side and on the production input side. It helps to generate special profits encouraging for farmers, so we recommend that you continue to protect wheat producers.

3- The local resource cost coefficients, which amounted to about 0.71 for the pivot sprinkler system and for the fixed spraying 0.93, indicated that the wheat production in Anbar providence under sprinkler systems has a comparative advantage and that pivot spraying is superior to fixed spraying, while it was found that agriculture under conventional irrigation does not have a comparative advantage. Therefore, we recommend switching to wheat cultivation under pivot spraying.

4- The ratios of the special costs of the wheat production system indicate less than one true. To the ability of wheat produced under subsidy conditions to competitive, and it was found that pivot spraying was distinguished over fixed spraying and the latter was distinguished over traditional irrigation in terms of competitiveness, so we recommend linking support to switch to sprinkler irrigation systems.

5- It was found that the sprinkler irrigation system achieved profits under intervention equivalent to five times the profit achieved in the absence of intervention, while the profit in fixed sprinkler irrigation farms increased to about 20 times. The adoption contributes to transforming traditional farms from loss-making farms to profitable farms.

6- Support for wheat production systems represents approximately 50% in pivot irrigation and 42% for the fixed spray farms, and 53% for the Conventional Irrigation farm; therefore, we recommend increasing support for pivot irrigation due to their comparative advantage.

Footnotes:

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