FACTORS AFFECTING THE ADOOTION OF SELECTED BRANDS OF RICE IN AN-NAJAF ALASHRAF PRONINCE FOR THE AGRICULTURAL SEASON 2017

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ABSTRACT
This research was implemented on rice farmers in An-Najaf Alshraf Province. It aims at economic assess of rice brands Jasmine – Anbar 33 – Anbar Albaraka .on random layer sample with ratio of 5% . The research depend, to achieving its targets, on using Cost-Benefit Analysis CBA and ADOPT program to assess these brands and identify how far farmers will be familiar to the best brand. Many conclusions have been achieved. The most important ones maybe: the net retuen which is 331 thousands Dinar/ dunums in case of cultivating the brand. This is higher than the net benefit in case of cultivating jasmine brand which is 289   thousand Dinars/ dunums. The interned rate of return was 1.23 . The standard ratio of benefit to the cost is 1.63% . and this refers that the Dinar invested in cultivating Anbar Albaraka brand will benefit with amount equal to 1.63 Dinar. Results also showed that it is expected to adopt brand of 52% of farmers during a duration of 14.9 years. The programs of ADOPT program have showed that it is expected there will be adaptation for the technology from 52% of farmers within a time duration may be about 14.9 . The sensitivity analysis indicated that there could be decrease or increase in this duration by effecting on number of factors such as short term financial restrictions-simple experimental of brand on limited scale- the degree of technical complexity- average awareness and cognition for farmers in using the brand – finally, the first investment to the annual benefit. So, according to the results, the adaptation of Anbar Albaraka will contribute, when cultivated on a large scale, in improving the standard of living of farmers and achieving part of developing targets in the agriculture sector.

العوامل المؤثرة في تبني اصناف مختارة من الرز في محافظة النجف الاشرف للموسم الزراعي 2017

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المستخلص
نفذ البحث على مزارعي الرز في محافظة النجف الاشرف وهدف البحث الى تقييم أصناف الرز الياسمين ، عنبر33 ، عنبر البركة   اقتصاديا لعينة طبقية عشوائية شكلت نسبة 5% من مجتمع الدراسة واعتمد البحث في تحقيق أهدافه على استخدام اسلوب تحليل التكاليف–العوائد Cost Benefit Analysis CBA و برنامج ADOPT لتقييم هذه الأصناف ومعرفة مدى تقبل المزارعين للصنف الأكفأ وقد تم التوصل الى مجموعة من الاستنتاجات لعل أهمها أن من المجدي اقتصادياً زراعة صنف عنبر البركة من خلال مجموعة من المؤشرات منها: العوائد الصافية اذ بلغت 331 الف دينار/دونم في حال زراعة الصنف، وهي اعلى من العوائد الصافية في حال زراعة صنف الياسمين والبالغ 289 الف دينار/دونم ، وبلغ معدل العائد الداخلي 1.23، ومعيار نسبة العائد الى الكلفة والبالغ 1.63% وهو يشير الى ان الدينار المستثمر في زراعة صنف عنبر البركة يعود بما مقداره 0.63 للدينار الواحد، كما اظهرت نتائج برنامج ADOPT أن من المتوقع ان يتم تبني الصنف من 52% من المزارعين خلال مدة زمنية تصل الى 14.9 سنة، واشار تحليل الحساسية الى انه يمكن تقليص او زيادة هذه المدة من خلال التأثير على مجموعة من العوامل منها: القيود المالية قصيرة المدى، سهولة تجربة الصنف على نطاق محدود، درجة تعقيد التقنية، معدل الوعي والادراك لدى المزارعين في استعمال الصنف، واخيراً نسبة الاستثمار الاولي الى العائد السنوي. وبناءً على النتائج المتحصل عليها فان تبني صنف عنبر البركة سيسهم عند زراعته على نطاق واسع في تحسين المستوى المعيشي للمزارعين، وتحقيق جزء من الاهداف التنموية في القطاع الزراعي

INTRODUCTION

The rice is considered to be a main and an important grain crop in the world. It ranks second after the wheat harvest in terms of importance. The nutritional importance of rice is that 100 g of rice gives 7 g of protein, 80 of carbohydrates, 24 mg of calcium, 94 mg phosphor, 2.9 mg of iron , 0.14 mg of vitamin B1 0.03 mg of vitamin B2 , 3.5 mg of thymine and 363 calories of energyy(6) . Cultivating rice is concentrated in An-Najaf and Dewaniyah provinces. There are two factors which effect the extension of cultivating this crop. The first factor is the area. The second factor is providing water (5) . The rice could be cultivated in the soils that are affected with salt. Other inconvenient agriculture soils could be cultivated with other crops, such as wheat and barley (20) . This is due to the nature of its growth, water and financial needs. This is why it is used worldwide as being rehabilitate crop. It grows in areas that are full in water. The problem of research is not achieving sufficient levels of production to meet the needs of local consumption, and as rice farmers in Najaf province often lack the optimal use of economic resources, it is necessary to identify the economic efficiency of rice plantations because of the different productivity of each category and evaluate the efficiency of each type of During the application of economic efficiency standards. At this point, the study is important as it contributes in providing the necessary information needed about the brand efficiency in the agricultural production. The study also recognizes how far the agricultural producers are maintaining the economic efficiency for each brand. The study is important because the rice is important in our life too. This crop is characterized with many distinguished features. The most important one is that it comprises 20-50% of the individual budget in food consuming (4) . The Iraqi can not abandon rice and it is an important source of the agricultural income for farmer families, which consists the solely agricultural income due to the nature of water and soil. The study aimed to conduct an economic assessment for the rice brands Anbar, jasmine, and Anbar Albaraka   by using Cost-Benefit Analysis CBA . In addition, the study aimed to identify farmers tendency in adopting new brands of this crop upon the analysis of Adopt .

MATERIALS AND METHODS

The study concentrated on choosing three main brands, Jasmine, Anbar 33, and Anbar Al Baraka in three areas Al- Mishkhab- Al-Hera, Al-Manathera . The number of farmers that cultivated the three brands of rice was 4700 . A random layer sample 5% of the study under discussion was taken with a questionnaire form prepared for this purpose. This questionnaire was made by face-to-face with 235 farmers for the agriculture season 2017. The number of jasmine brand in the sample of areas under discussion was 2400 farmers and 120 forms were collected. While the number of farmers of Anbar 33 was 1600 and 80 forms were collected i.e 5% of the total number of forms. Finally, the number of farmers for Albaraka brand was 700 and 35 forms were collected. An equal proportional distribution method for each layer, upon its relative weight for the study under discussion, was chosen due to being the best and the most suitable method to the heterogeneous layer groups

Table 1. sample farmers' distribution by area in An-Najaf Al-Ashraf province

Elimination / side	Anbar 33		Jasmine		Anbar Al Baraka	
	The number of farmers	Ratio %	The number of farmers	Ratio %	The number of farmers	Ratio %
Al-Hera	18	22.5	34	27.3	0	0
Mishkhab	39	48.75	60	50.0	35	100
Manathera	23	28.75	26	21.7	0	0
Total	80	100	120	100	35	100

Source: Field assessment form data and ratios made by the researcher

The table above shows that the farmers ratio of Alhera area was 22.5% farms of the Anbar 33 brand with 18 farmers and 27.3% of the Jasmine brand farms with 34 farmers of the sample. While the ratio of farmers in the Manatherah area was 28.75% farmers of the Anbar 33 brand, with 23 farmers and 22% of the farmers of the Jasmine brand and 26 farmers of the sample under discussion. Data have been analyzed by using the Cost –

Benefit Analysis CBA which is a modern methodological economic analysis method to assess the alternatives or the techniques used that can maintain best economic incomes. Consequently, it will improve the standard of living of the farmers. In other words, it is considered as an analysis of an act of different alternative cost, to identify whether advantages are more than cost and vise versa (6) .

ADOPT Program Application
ADOPT program is a common method in measuring adaptation degree. It measures farmer tendencies on using the most efficiency brand upon the cost-benefit analysis CBA and the duration farmers needed to adopt such brand. It depends on the descriptive analysis of qualitative data. The ADOPT program contains a concentrated form on 22 social questions answered by farmers who adopt and those who do not adopt, knowledgeable farmers, and researchers related (15) . Questions are asked collectively. Then the answer rate is taken. After the answers are downloaded in the ADOPT program, a percentage of farmers who are going to adopt the brand according to certain time period (17) .**Analysis and Results Discussion**
 First – Cost-Benefit Analysis CBA for rice farmers brand of Anbar 33 and Jasmine. Cost-benefit analysis was carried out to evaluation of product efficiency of the two brands of rice , Anbar 33 and Jasmine. Jasmine brand has been chosen for its high productivity, while the brand of Anbar 33 is preferable to farmers due to its most common perfumed rice. A set of standards were used, the most important one is being the net benefits, and the inputrate of benefit, which helps to assess whether the adoption of the technology could make rice farmers in the area better than the current situation. Through the CBA analysis of the farmers Anbar 33 brand in compare to the farmers of the Jasmine brand in An- Najaf Alashraf province and as showed in table 2. The most important standards were used and the results were as in the following:
1- Net Benefits If the net current value is positive i.e the current value of cash flows income is more than the current value of cash flows output. In this case the investment is profitable. On the contrary, If the net current value is negative,   we have the vise versa rule

and the investment is non-profitable (8), i.e the current value of cash flows income is less than the current value of cash flows output. In case of having more than one investment project, the best one will be the one that gives highest net benefits (22) .   The results showed that the net benefits in using Jasmine brand were 289171.7 ID/dunums. This is higher than the net benefits when using the brand of Anbar 33 which is 200123.4 ID/dunums. This is indicating that the benefits of farmers using the Jasmine brand are higher than those in the case of Amber 33 brand
2- Input Benefits Rate It expresses the minimum of benefits on capital, which makes the net current value of flows equal to the investment cost of the investment. It recurrents the minimum benefit on the capital accepted by the farmer for the investment in technology 7 . It is can be resulted by dividing the ratio of change in net benefits of 0.44 to the rate of change in the total costs 0.23 . We find the inputrate of benefits, when using the Jasmine brand, is equal to   1.90% . This rate refers that the use of the Jasmine brand makes remunerative benefits for farmers.
Benefit– Cost Ratio
The Cost – Benefit rate is the total cash flow income divided by the total cash flow output. This is when there is a discount rate equal to the alternative chance cost of the capital. The investment would be accepted if the benefit rate to the cost rate had been bigger than or equal to one and rejected if it had been less than one 18 . The results showed that the rate of benfit in case of using Jasmine brand was 1.49% dunums. This rate refers that the one Dinar invested in the cultivation of Jasmine brand is 1.49 ID. It is higher than the ratio of benefit to costs in case of using Anbar 33 brand with 1.42% , which is a motivation for farmers of Jasmine brand. The standards mentioned above clarify that the cultivation of Jasmine brand is more economical. In addition, the cultivation of this brand leads to a slight increase in cost %Change in TC equal to 0.23% , While the increase in benefit was greater with 0.44% . Thus, the use of this brand leads to increase in the benefit and a little increase in the standards mentioned above. So, it is clear that the use of jasmine

brand is the best economical brand. The use of   this brand also increases the profits

Table 2. Cost – Benefit Analysis of Anbar 33 and jasmine brand farmers

Jasmine		Anbar 33	
Cost Dinars / dunum	**in put¹**	**Cost Dinars / dunum**	**in put¹**
27000	plowing	24200.00	plowing
46781.04	seeds	44829.17	seeds
34657.74	fertilizer	32587.41	fertilizer
42493.32	pesticides	38013.36	pesticides
64736.66	Farm work	59713.00	Farm work
100000	fuel	100000.00	fuel
131053	mechanization	138836.80	mechanization
139106.6	harvesting	86696.82	harvesting
585828.3	total	524876.60	total
Return Dinars / dunums			
1.25	Productivity	0.95	Productivity
700000	Price	900000	Price
875000	Total return	855000	Total return
indicators			
289171.7	Net returns of Jasmine	200123.4	Net returns of anber33
0.444966706			Change in Net returns
0.233643317			% Change in total cost
1.904470081			Interal rate of return
1.493612	Cost-Benefit Ratio	1.421422	Cost-Benefit Ratio

Source: made by the researcher depending on analysis resuts of CBA .

Second : Cost – Benefit Analysis CBA of Anbar 33 and Anbar Albaraka brand farmers

Through the Cost – Benefit Analysis CBA of jasmine and Anbar Albaraka brand farmers as in table 3 we found that:

1- Net Benefit The net benefits in using Anbar Albaraka brand were 331320 ID/dunums. This is higher than the net benefits when using the brand of jasmine which is 289171 ID/dunums. This could be related to the fact that Anbar Albaraka farmers have greater efficiency in managing and improving the crop production in the area unit as well as the high sale price of this brand in compare to the sale price of jasmine brand.

Input Benefit Rate

It reflects the minimum benefit on capital, which makes the net current value of input flows equal to the investment project cost. It recurrents the minimum benefit on the capital accepted by the farmer to invest in technology 7 . The income rate of benefit in the cultivation of the Anbar Albaraka is about 1.23 . This is related to the fact that the use of this brand would be more useful to rice farmers. It has been calculated dividing the rate of change in the net benefits which is 0.15 by the rate of change in total costs which is 0.12 .

2. Cost-Benefit Ratio The ratio of benefit to cost by using the Anbar Al Baraka brand has been shown at a value of about 1.63 . This refers that the Dinar invested in cultivating this brand will benefit with 1.63 dinars. This is due to the fact that the total benefit of 855000 ID/dunums exceeds the total costs 523680 ID/dunums.

Table 3. Cost – Benefit Analysis CBA of Anbar Albaraka and jasmine brand farmers

Jasmine		Anbar Al Baraka	
cost	In put	cost	In put
27000	plowing	25000	plowing
46781.04	seeds	45000	seeds
34657.74	fertilizer	35000	fertilizer
42493.32	pesticides	43680	pesticides
64736.66	Farm work	40000	Farm work
100000	fuel	100000	fuel
131053	mechanization	140000	mechanization
139106.6	harvesting	95000	harvesting
585828.3	total	523680	total
return			
875000	Total return	855000	Total return
indicators			
289171.7	Net returns	331320	Net returns
0.15		Change in Net returns	
0.12		% Change in total cost	
1.23		Interal rate of return	
1.493612	Cost-Benefit Ratio	1.63	Cost-Benefit Ratio

Source: made by the researcher depending on data questionnaire form analysis

Third : prediction of the possible adoption of Anbar Al baraka brand by the farmers of jasmine using ADOPT program. ADOPT program was used to assess the adoption rate of the Anbar Al baraka brand and to identify the main obstacles to adoption, which is a tool for predicting the results of adoption and distribution results. The ADOPT program predicts the proportion of target farmers who may adopt this brand over time (7) . The methodology for discussion which was used is the Focus group Discussion FGD . The information related to ADOPT program has been collected through sharing group of farmers, researchers, and technical experts who answered a set of 22 intent questions. The ADOPT program depends on answers to the qualitative and quantitative questions of each of the 22 variables affecting adoption.

Analyzing data in this process leads increase knowledge on how variables relate to each other and how they affect on adoption and distribution. The Adopt program data has been collected through the group discussion on analytical questions i.e., discussion and decisions are adopted collectively on what they believe on the appropriate answer . Professional researchers   explain those questions i.e. help to remove the confusion and explain why they chose the answer . Farmers have been asked to consider their problems related to the adoption of the Anbar Al Baraka brand. The results of the program predicted that 54% of farmers of the Jasmine brand will adopt Anbar Al Baraka brand after a period of time of up to 14.9 years, as shown in table 4.

Table 4. expected adaptation levels

adaptation levels	expectation
years expected to claim peak adaptation	14.9%
expected climax level for adaptation	54%
Adaptation level expected after first 5 years	25.5%
Adaptation level expected after first 10 years	51.5%

Source: made by the researcher depending on results of ADOPT program analysis

The above table clarifies that, the climax rate of adopting Anbar Albaraka brand is expected to be 52% after 14.9 years. The adaptation rate will be 49.6 of targeted farmers after 10 years of using the technique. The ratio may be 24.5% of targeted farmers after 5 years of implementing. This is according many factors such as farmers profits, environmental policy, risks, number of farmers expected to be benefited from such brand, environmental and profits virtues, easy implement and use, risks, investment, and relative simple cost . So the technique adaptation peak climax level will be average of hight as shown in figure 1 .
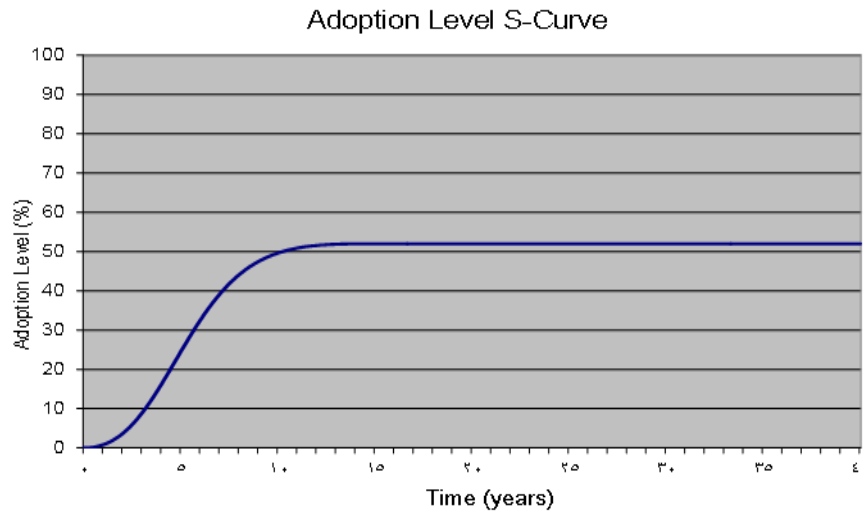

Figure 1. the time required for the adoption of the Anbar Albaraka brand to reach climax
Source: made by the researcher depending on results of ADOPT program

Sensitivity Analysis

Considering the interpretation of the sensitivity analysis of the main factors that influence the level and peak of adoption, the most important variables have been found to be:

1. Short-term financial constraints
2-Easy technical practice of a limited scale 3. Degree of complexity in technique.
4. The rate of awareness and understanding of farmers in the use of technology.
5. Ratio of initial investment to annual benefit

As shown in table 6, all factors are combined to affect the time needed to reach the adoption peak. Figure 2 recurrents intensity impact level of each variable. The red color recurrents variable influences extent on increasing time needed to reach the adoption peak in case of mismanagement of the technology or neglecting high-impact variables. The green color recurrents variable influences extent on decreasing time needed to reach the adoption peak by controlling those variables and trying to provide suitable conditions to mitigate the high- impact of the variables. Results shows that half of the farmers are suffering real lack as far as financial issues are concerned. If farmers are able to run off this constraint, it will help reduce the adoption period by one year. But if this strain persists and spread over a wide range of farmers, it will increase the duration of adoption by one year. The same thing could be said about the technique ability to be practiced on short term. The easier it is to practice the technology on small areas, to determine its results and the benefit of its use before making a decision to use it widely, the shorter duration by 1.5 years. If it is difficult to be practiced on limited scale, it will increase its adoption by 1.5 years. In the degree of complexity in technique, the more simple and easy to use it is, the less time it needs to be adopted by 1.5 years and vice versa. The presence of technical skills and know-how reduces the duration to 1.75 years and vice versa. In the initial cost of investment for benefits, the lower the amount of time required to reach adoption peak by 0.75 and as shown in table 6 .

Table 6. factors affected adoption level and time needed to reach adoption peak

variable	expected effected time
Short-term financial constraints	1 ±
Their ability to practice on a limited scale	1.5 ±
Degree of complexity in techniques	1.5 ±
Awareness of the importance of technology	±1.75
Initial relative cost of technology	±0.75

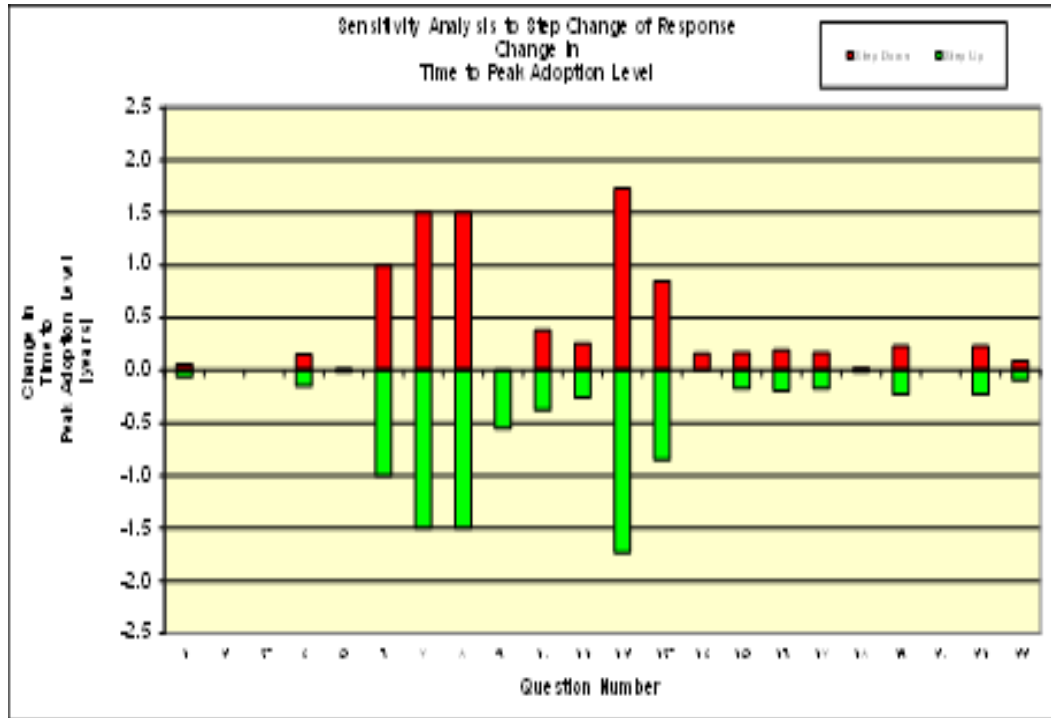**Source: made by the researcher depending on results of ADOPT program**

Figure 2. Sensitivity analysis of variable response to reach the peak
Source: made by the researcher depending on results of ADOPT program

Table 6 shows that the variables have a duration of influence among each other on the time required to reach adoption peak. We find the greatest period of influence has been for the two variables the technical weakness of the practice on a limited scale, the degree of complexity of the technology was 1.5 years. The attention to the two variables is therefore a priority. This can be maintain by reducing the time frame for influencing by set of procedures, for example, by reducing the complexity of the technique and focusing on its ability to practice it on limited scale as well as advisory support and the existence of skills and knowledge to use the technology. While factors that have a little impact, it is preferable to keep on the short time or reducing it as far as possible. This could be done through intensifying programs and plans that contribute in decreasing time needed to reach the adoption peak.

The research concluded of the CBA analysis refers that the net current value in the case of Anbar Albaraka cultivation was 331320 ID/dunums, it is higher than the net current value of Jasmine cultivation, which was 289171.7. This is an indication that the adoption of the Anbar Albaraka increases the profits to the farmer. This may be related increases the prices of Anbar Albaraka brand and the efficiency of this brand farmers which are more efficient than the farmers of the Jasmine brand. So, we can say that the brand of the Anbar Albaraka is a perfumed type that is equivalent or equal to the economic type of Jasmine
Through the results of the CBA analysis, the input rate of benefit showed that the benefit was greater than the cost of capital investment in the technology   1.23% . This indicates that the cultivation of the Anbar Albaraka is economically reasonable

Through the results of the CBA analysis, it was found that the rate of benefit to the costs in case of Anbar Albaraka brand cultivation was 1.63% . This indicates that the dinar invested in the cultivation of this brand will have benefit 1.63 dinars. This is a strong motivation to encourage farmers to adopt Anbar Albaraka brand

The results of the ADOPT program analysis show that the percentage 52% of rice farmers who are expected to adopt Anbar Albaraka brand , after a period of time equal 14.9 years. we conclude that the spread of the brand requires some time to gain the confidence of farmers and change the pattern of farming farmers used to do. This can be maintain when considering the economic and environmental effects to use of this brand

The sensitivity analysis clarifies that the main factors influencing the level of adoption of Anbar Albaraka brand and reducing the time to reach the adoption peak are: short-term financial constraints, ability to practice the brand on limited scale, technical complexity degree, awareness of the importance of technology for the brand , and finally the proportion of the initial investment to the annual benefit. We conclude that the time required to reach the peak of the Anbar Albaraka brand through improving the performance of these variables and to work to gain the confidence of the farmer in the brand.

The research recommoeaded activating agricultural guidance in training and directing farmers to adopt modern brands and providing sufficient seeds of the said brands to be used as well as holding Farm Days in creator and distinguish farms sites and workshops along crop agriculture season.

Redirecting economical resources included in the productivity process by agricultural crop of rice to maintain optimal exploitation of resources so as to reduce lost in economic resources available. This could be achieved by depending on experts and professional of this kind of crop who have maintained optimal economic efficiencyActivating the role of the peasant associations in the agricultural areas, to provide modern brands and production materials, and to establish working groups of farmers to discuss agricultural operations related to modern techniques and brands and to find solutions to the problems facing their work.

State role in encouraging and supporting the cultivation of rice crops in the suitable and convenient areas, particularly in the An-Najaf Alashraf provinve. This is due to its features of good conditions for the cultivation of this crop. The role of the state has to be extended to the need to providing enough water rations, which are among the most problematic for farmers, in order to increase production to meet the needs of the local markets.

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