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FARMERS' RESPONSE TO THE USE OF HYBRID CORN SEEDS SUPERIOR VARIETIES

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ABSTRACT

Superior varieties of corn seeds are an innovation in the agricultural sector that has advantages. The government's efforts, through the Maros Cereal Crops Research Institute, are accelerating the adoption of innovation by providing free superior varieties of hybrid corn seeds to farmers. In order for the program to be implemented well, farmers' responses need to be studied. The aim of the research is to describe farmers' responses to the use of superior varieties of corn seeds, calculate the increase in hybrid corn production after using superior varieties of corn seeds, and analyze the correlation between the responses of farmers using superior varieties of corn seeds and the level of hybrid corn productivity. The research was carried out in Takalar Regency, South Sulawesi Province, lasting for 8 months. The survey method involves conducting in-depth interviews with corn farmers. Determination of the sample using the simple random sampling method. Quantitative descriptive analysis, farming productivity and correlation analysis were used to analyze research data. The research results show that the NASA 29 hybrid corn seed is an innovation of the Ministry of Agriculture's Research and Development Agency, with a potential yield of 13.5 tons ha-1. It is the result of a cross between the hybrid line G10.26-12 as the female parent and MAL03 as the male parent. This hybrid corn parent was taken from the Maros Serealia Center. The superior seed varieties used by respondent farmers are NASA 29 seed varieties and Jh variety 29 seeds. Socio-economic characteristics of farmers, namely age 42 years, formal education completed high school, 17 years of farming experience, farmer income IDR 5,863,636, and an average the farmer's land area is 0.43 ha. The cognitive response score of 752, the affective response score of 541, and the psychomotor response score of 791 are in the good response category. Hybrid corn production before using superior variety seeds was 4,403 kg ha-1 and after using superior variety seeds was 7,751 kg/ha. Increase in corn production by

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76.06%. There is a significant relationship between farmers' responses to using superior varieties of corn seeds and the level of corn production.

Keywords: farmer response, corn seeds, superior varieties, NASA 29.

1. INTRODUCTION

Corn is one of the important commodities in Indonesia and currently the need for corn is increasing because corn is widely used by various industries such as the food industry, animal feed and other industries that use corn as the main raw material. Therefore, farmers need superior varieties of corn seeds that are capable of high production and are resistant to pest and disease attacks [1].

South Sulawesi is one of the fifth largest corn producing regions in Eastern Indonesia. The harvest area is 420,984 ha, with an average production of 5.5 tons/ha [2]. Looking at the data on the harvested area and corn production produced, it can be said that production is still low, making it possible to make efforts to increase corn production. One of the causes of low corn production in South Sulawesi, especially in Takalar Regency, is that the use of new superior variety technology at the farmer level is still low. Therefore, it is necessary for farmers to use superior varieties of corn seeds so that corn production increases. The following planting area, harvest area, production and productivity of corn plants in Takalar Regency [3] can be seen in Figure 1.

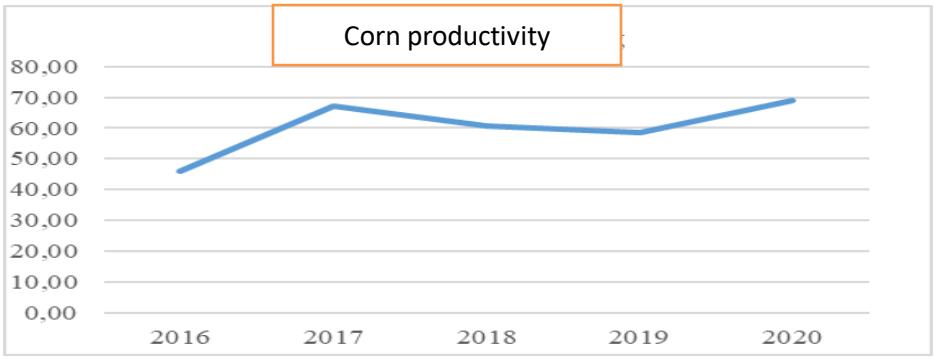

Figure 1: Development of corn productivity in Takalar Regency, 2018-2022. (Source: Central Statistics Agency, South Sulawesi, 2023).

Figure 1 shows fluctuations in corn production in Takalar Regency, South Sulawesi, where the highest corn production will be in 2022, namely 69 tonnes/ha. The availability of quality and certified seeds is needed to support efforts to increase production and quality of agricultural products. Providing quality seeds for farmers at affordable prices is still hampered. Providing seeds in large quantities continuously requires the support and involvement of various

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stakeholders. Superior varieties of corn seeds are an innovation in agriculture that has the opportunity to be adopted by farmers because it has advantages such as resistance to certain pests and diseases, higher production capacity, and is easy to cultivate [4]. One of the government's efforts to accelerate the adoption of innovative new superior corn varieties is by providing assistance to farmers in the form of subsidies for free superior hybrid corn seeds carried out by the Maros Regency Cereal Crops Research Institute. It is hoped that the government's efforts will be able to increase the production and productivity of corn farming. Farmers' perception of a technological innovation is a process of interpreting the stimulus received by farmers before farmers make a decision to accept or reject the innovation. Perception in adoption is the second stage, where in the first stage farmers obtain information about new superior varieties of corn seeds through counseling, print media, demonstrations and so on. The information obtained by farmers is then assessed based on the nature of the innovation, such as its superiority, ease, suitability, can be tried and can be seen [5]. Based on the theory put forward by Caffe in Aris [6], responses are divided into three parts, namely: cognitive (knowledge), affective (attitude), and psychomotor (action). Indicators of farmers' response to the use of superior varieties of hybrid corn seeds

1.1. Formulation of the problem

Based on the description in the background, the problems that will be studied in this research are:

1. How do farmers respond to the use of superior varieties of hybrid corn seeds?

2. Does corn production increase after using superior varieties of hybrid corn seeds?

3. Is there a correlation between the response of farmers who use superior varieties of hybrid corn seeds and the level of hybrid corn productivity?

1.2. Research purposes

Based on the description of the background and problem formulation, the objectives to be achieved in this research are:

1. Describe farmers' responses to the use of superior varieties of corn seeds

2. Calculate the increase in hybrid corn production after using superior varieties of corn seeds.

3. Analyze the correlation between the response of farmers who use superior varieties of corn seeds and the level of hybrid corn productivity

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2. RESEARCH METHODS

This research was conducted in Takalar Regency, South Sulawesi Province. Sanrobone District is one of the sub-districts that receive assistance from superior varieties of hybrid corn seeds from the Maros Regency Cereal Crops Research Institute. The research implementation time is 8 (eight) months and is adjusted to the research budget year.

The data analysis method used is:

***a. Quantitative Descriptive Analysis*.** is used to describe superior varieties of hybrid corn seeds and describe the socio-economic characteristics of farmers. Measurement of the socio-economic characteristic variables of farmers studied included age, formal education, non-formal education, farming experience, income and land area [7] [8]. Measuring farmers' responses to the use of superior varieties of hybrid corn seeds produced by the Maros Cereal Crops Research Institute includes cognitive, affective and psychomotor responses using a Likert scale where each statement is given three answer choices with a value range of 1-3, namely:

Table 1: Category for Measurement of Farmer Response Variables to the Use of Superior Varieties of Hybrid Corn Seeds

No	Score	Interval Score	Farmer Response Measurement Category		
			Cognitive	Affective	Psychomotor
1	Score 1	1,0-1,6	Not suitable	Not available	Not skilled
2	Score 2	1,7-2,3	Less suitable	Less available	Less skilled
3	Score 3	2,4-3,0	Suitable	Available	Skilled

Source: Likert Scale [9]

Measurement of farmers' response variables to the use of superior varieties of hybrid corn seeds obtained from the Maros Cereal Plant Research Institute includes cognitive, affective and psychomotor variables which can be seen in Table 2 below:

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Table 2: Variables and Indicators of Farmers' Responses to the Use of Superior Varieties of Hybrid Corn Seeds

FarmerResponse Variables	Indicator Farmer Response	Measurement Scale
Cognitive Response is the farmer's knowledge about the superiority of superior varieties of hybrid corn seeds	1. Good quality/quality of corn seeds (storage capacity, growth capacity) 2. Seed uniformity (uniformity of seed size, simultaneous harvest age) 3. Superior seed resistance to pests and diseases 4. Superior varieties of corn seeds will increase crop yields	Likert Scale (1,2,3)
Affective responses are farmers' attitudes, interests, self-concept, values and morals towards the use of superior varieties of hybrid corn seeds	1. Availability of seeds 2. Availability of information about superior seeds 3. Interest in the use of corn seeds from Balitsereal Maros 4.	Likert Scale (1,2,3)
Psychomotor Response is the farmer's ability to apply superior varieties of hybrid corn seeds	1. Treat seeds before planting 2. Use of seeds per hectare 3. Treatment of plant spacing 4. intenance	Likert Scale (1,2,3)

Source: Modification of Previous Research [10]

b. Productivity Analysis

Information about the amount of hybrid corn production before and after using superior varieties of hybrid corn seeds was obtained through farmer interviews. Hypothesis testing criteria are:

If Q-t > Qt, then the hypothesis is rejected

If Q-t < then the hypothesis is accepted

c. Correlation Analysis

To test the relationship between farmers' responses to using superior varieties of hybrid corn seeds and the level of hybrid corn production, non-parametric statistical tests were used to see the correlation between the two variables. Chi square analysis is used to calculate the correlation/relationship between variables if the data is in nominal and ordinal form [11].

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3. RESULTS AND DISCUSSION

Respondent Identity

The identities of the respondents in this research were farmers who received assistance from superior varieties of corn seeds in Sanrobone District, Takalar Regency and 1 informant from the Cereal Crops Research Institute, Maros Regency. The identity of the farmer respondents is that the average age is 42 years, the average formal education level is high school, the main occupation of the respondents is corn farmers, and the farming experience of the corn farmer respondents is 17 years. The individual characteristics of the informant from the Cereal Crops Research Institute are 48 years old, have a master's degree, main job as research services coordinator and have 24 years of experience.

Corn Seeds Planted by Farmers

Superior varieties of corn seeds are the main production factor that determines the success of corn farming. Superior varieties are varieties that have certain advantages, namely a short planting period, resistance to pests and diseases and suit local environmental conditions. Several types of new superior corn seed varieties produced by the Maros Cereal Plant Research Institute are: Nakula Sadewa 29 (NASA 29), varieties Jh 29, Jh 30, Jh 31 and Jh 37.

The hybrid corn varieties planted by farmers are the NASA 29 variety and the Jh 29 variety. In general, farmers use the NASA 29 variety (91%), these seeds are assistance obtained from the Maros Cereal Plant Research Institute. The reason farmers use superior varieties of corn seeds is that they are more resistant to disease, have higher productivity so that farmers' income is also greater.

Socioeconomic Characteristics of Farmers

The socio-economic characteristics of corn farmers observed were age, formal education, non-formal education, farming experience, income and land area. These farmer characteristics are observation variables to determine farmer responses to the use of superior varieties of hybrid corn seeds.

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Table 3: Characteristics of Corn Farmer Respondents in Sanrobone Village, Takalar Regency

No	Respondent Characteristics	Number of Farmers (people)	Percentage (%)
1	Age (years)		
	a. 35 – 41	45	65
	b. 42 – 48	12	18
	c. 49 - 55	9	9
2	Formal education		
	a. SD	23	35
	b. SMP	13	20
	c. SMA	30	45
3	Non Formal education (counseling)		
	a. < 2 kali	30	45
	b. 2 – 4 kali	32	48
	c. > 4 kali	4	6
4	Corn Farming Experience(years)		
	a. 10 - 14	8	12
	b. 15 -19	37	56
	c. 20 - 25	21	32
5	Revenue (Rp in million)		
	a. 3.5 – 5.5	27	41
	b. > 5.5 – 7.5	24	36
	c. > 7.5 – 9.5	15	23
6	Land area (hectares)		
	a. 0.25 – 0.46	42	64
	b. 0.47 – 0.67		

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c.	0.68 – 0.90	18	27
		6	9

Source: Primary Data, 2023

Based on Table 3, it shows that the characteristics of respondents based on age, the highest frequency is in the 35-41 year age group with a percentage of 65%. The average age of respondents is 42 years and falls into the productive age category. The productive age of farmers is in the age group 15 – 64 years [13]. Shows that the respondents in this study fall into the category of productive age. In the productive age, farmers have high enthusiasm in managing corn farming, being more innovative, especially when using superior varieties of hybrid corn seeds,

The dominant education level of the respondents was at the high school level as much as 45%, meaning that the majority of respondents were quite educated, but were less active in participating in extension activities. The length of time most farmers have been farming is in the 15 – 19 year category with a percentage of 58%, meaning that most farmers are quite experienced in running corn farming.

Respondents' income obtained from corn farming during one planting season was mostly in the interval IDR 3.5 - 5.5 million with a percentage of 41%. The average income is IDR 5,863,636, this income is the net income of farmers obtained from an average land area of 0.43 hectares. The land managed by farmers is land with property status. Information from farmers that some of their land has been sold for reasons of economic necessity.

Farmers' Response to the Use of Superior Varieties of Corn Seed

The response of corn farmers in Sanrobone District, Takalar Regency was described based on cognitive responses, affective responses and psychomotor responses. The farmers' responses to the use of superior varieties of hybrid corn seeds are as follows:

Cognitive Response

The cognitive response is the level of farmers' knowledge regarding the superiority of superior varieties of corn seeds obtained from the Maros Cereal Crops Research Institute. There were 4 questions given to farmers as respondents, namely knowledge about the quality of seeds by looking at the storability and growth capacity of hybrid corn seeds, knowledge about seed characteristics by looking at the uniformity of seed size and harvest age in superior varieties of corn seeds, knowledge about the ability of hybrid corn superior varieties regarding resistance to pests and diseases that attack plants, and knowledge about increasing yields/production after using superior varieties of corn seeds.

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Table 4: Farmers' Cognitive Responses to the Use of Superior Varieties of Corn Seeds

No	Knowledge	Total Score	Average score	Category
1	Seed quality	184	2.8	Available
2	Seed uniformity	185	2.8	Available
3	Seed resistance	185	2.8	Available
4	Yields	198	3.0	Available
	Total Cognitive Response Score	752		good response

Source: Primary data analysis, 2023

Based on the results in Table 4, it shows that the farmer's cognitive response level obtained a total score of 752 in the good category. This means that farmers responded well to the superiority of superior varieties of corn seeds obtained from the Maros Cereal Crops Research Institute. Respondents' knowledge about the advantages of these seeds is in accordance with what they knew while planting the seeds, namely high corn production, the contents of the seeds in the cob are even and full, the fenugreek is completely closed so that when harvesting water does not enter the cob (if it rains) and it is resistant to leaf pest attacks, downy mildew and ear rot.

Based on these results, it can be concluded that overall the respondents have good knowledge and are in line with the respondents' expectations regarding the superiority of superior varieties of corn seeds obtained from the Maros Cereal Plant Research Institute, both in terms of seed quality, seed uniformity, seed resistance, and knowledge about corn production.

Affective Response

Affective response is the level of farmers' attitudes and interest in using superior varieties of corn seeds obtained from the Maros Cereal Crops Research Institute. There were 3 (three) questions asked to respondent farmers, namely the condition of availability of superior varieties of corn seeds from the Maros Cereal Crops Research Institute at any time, the availability of information obtained from extension activities carried out by the Maros Cereal Crops Research Institute, and farmers' interest in using corn seeds. superior varieties from the Maros Cereal Plant Research Institute.

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Table 5: Farmers' Affective Responses to the Use of Superior Varieties of Corn Seed

No	Attitude	Total Score	Average Score	Category
1	Seed availability	173	2.6	Available
2	Availability of information about superior seeds	175	2.7	Available
3	Interest in using superior seeds from the Tan Research Institute. Cereal Maros	193	2.92	Interested
	Total Affective Response Score	541		good response

Source: Primary data analysis, 2023

Table 5 shows that the farmers' affective response level obtained a total score of 541 and is included in the good category. This means that respondents have a good attitude and interest in the use of superior varieties of corn seeds obtained from the Maros Cereal Plant Research Institute, both in terms of seed availability and the availability of information about superior varieties of corn seeds. Respondents are interested in using superior seeds repeatedly and continuously.

Based on these results, it can be concluded that overall respondents responded well to the use of superior varieties of corn seeds obtained from the Maros Cereal Plant Research Institute.

Psychomotor Response

The affective response is the farmer's ability to apply and use superior varieties of corn seeds obtained from the Maros Cereal Crops Research Institute. There were 4 (four) questions about skills asked to respondent farmers, namely seed treatment before planting, use of seeds per hole, plant spacing, and plant maintenance.

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Table 6: Farmers' Psychomotor Responses to the Use of Superior Varieties of Corn Seeds

No	Skill	Total Score	Average Score	Category
1	Seed treatment before planting	197	3.0	skilled
2	Use seeds per hole	198	3.0	skilled
3	Plant spacing treatment	199	3.0	skilled
4	Maintenance	198	3.0	skilled
	Total Skor Respon Psikomotorik	791		skilled response

Source: Primary data analysis, 2023

Table 6 shows that the farmer's psychomotor response level obtained a total score of 791, including the skilled category. This means that respondents are skilled in applying superior varieties of corn seed cultivation techniques obtained from the Maros Cereal Plant Research Institute, that is, farmers are skilled at preparing seeds. Seed treatment before planting is soaking in plain water for approximately 12 hours and giving it an anti-pest with the aim of ensuring uniform seed growth. Skillfully plant at a spacing of 25 x 75 cm as recommended, using 3-5 perforated seeds. Information about how to plant properly is printed on the seed packaging, making it easier for farmers to apply.

Based on these results, it can be concluded that overall the respondents were skilled in applying and using superior varieties of corn seeds obtained from the Maros Cereal Crops Research Institute as recommended. Several research results show that farmers respond well to the use of hybrid corn seeds because they have high productivity compared to non-hybrid corn seeds [14] [15], have better and more uniform growth, are resistant to downy mildew and are tolerant of drought [16].

Hybrid Corn Production

Production provides important information obtained as a result of the production process, which describes the physical relationship between input and output. Farming production levels vary, influenced by the use of inputs. Apart from that, the use of innovation and new technology is also a determining factor in production levels, for example by using superior seeds. This research compares hybrid corn production before and after using superior varieties of corn seeds from the Maros Regency Cereal Crops Research Institute.

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Table 7: Hybrid Corn Production Using Superior Varieties of Corn Seeds.

No	Description	Before Using Superior Varieties (Q^{-t})	After Using Superior Varieties (Qt)
1	Land area	0,43	0,43
2	Average production (kg/farmer)	1.898	3.342
3	Average production (kg/hectare)	4.403	7.751
4	Production increase (%)	76,06%	

Source: Primary data analysis, 2023

Table 7 shows that the average hybrid corn production before using superior varieties of corn seeds was 1,898 kg/farmer or 4,403 kg/ha. Meanwhile, the average hybrid corn production after using superior varieties of corn seeds was 3,342 kg/farmer. or 7,751 kg/ha. These results show that corn production after using superior varieties of corn seeds obtained from the Maros Cereal Plant Research Center is higher than before using superior varieties of corn seeds. The increase in production after using superior varieties of corn seeds was 76.06%.This research resulted in corn production levels that were in line with those produced in the Biba research using superior seeds of the BIMA-3 variety with a production of 9.5 tonnes/ha, the SHS-11 variety with a production of 6.9 tonnes/ha and the BISI-2 variety producing a production of 7.9 tons/ha [16].

Relationship between cognitive, affective and psychomotor responses with corn production

This research analyzes the correlation between the response of farmers who use superior varieties of corn seeds and the level of corn production. It is suspected that if farmers' cognitive, affective and psychomotor responses to the use of superior varieties of corn seeds are good, it will increase corn production. The results of the correlation test analysis between farmer responses and corn production levels are shown in Table 9 below:

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Table 8: Correlation Between Farmers' Responses and Corn Production Levels.

No	Farmer Response	Significance (p- value)	critical limit	information
1	Cognitive	0,000	0,05	correlated
2	Affective	0,000	0,05	correlated
3	Psychomotor	0,000	0,05	correlated

Source: Primary data analysis, 2023

The results of the analysis in Table 8 show that statistically there is a significant and positive relationship between farmers' knowledge, skills and attitudes in using superior varietal corn seeds and corn production levels. This means that if you want to increase corn production, farmers' knowledge about hybrid corn seeds need to be increased by increasing counseling and assistance regarding the use of superior varieties of corn seeds. These results are in line with the results of Sejati's research that the response of corn farmers to hybrid corn seeds was very good. Relatively high productivity compared to non-hybrid corn [17]

CONCLUSIONS AND RECOMMENDATIONS

1. Farmers' cognitive, affective and psychomotor responses are in the good category. Farmers respond well to the superiority of superior varieties of corn seeds, have good attitudes and interests, and are skilled in applying techniques for cultivating superior varieties of corn seeds obtained from the Maros Cereal Crops Research Institute.

2. Corn production after using superior varieties of corn seeds is higher than before using superior varieties of corn seeds. The increase in production after using superior varieties of corn seeds was 76.06%.

3. There is a significant and positive relationship between cognitive, affective and psychomotor responses in using superior varietal corn seeds and corn production levels. This means that if you want to increase corn production, farmers' knowledge, skills and attitudes regarding hybrid corn seeds need to be improved by increasing counseling and assistance regarding the use of superior varieties of corn seeds

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