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Potential for Development of New Superior Varieties (VUB) of Inpari 42 and Inpari 43 Rice in Tegal Regency, Every word must begin with a capital letter)

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ABSTRACT

This study aims to analyze internal and external factors influencing the development of New Superior Varieties (VUB) of Inpari 42 and Inpari 43 rice in Tegal Regency. The method used is a mixed method with a convergent parallel design, where primary and secondary data were collected from 41 respondents consisting of policy elements, officials, farmers, traders, and rice consumers in 10 sub-districts. A SWOT analysis was used to map the potential for VUB development. The results of the IE matrix mapping indicate that VUB Inpari 42 and Inpari 43 are in quadrant V, which indicates potential, but requires extra efforts to overcome existing challenges. Based on the SWOT analysis, the recommended strategy is to optimize high yield quality and resistance to pests and diseases to meet the demand for high-quality rice, establish partnerships with agricultural input providers to improve access to technology and infrastructure, and increase promotion and counseling regarding the advantages of VUB to overcome competition with other varieties..

Keywords: *SWOT, Development, Superior rice varieties, Inpari 42, Inpari 43*

INTRODUCTION

Rice is a key food crop that plays a strategic role in meeting the food needs of the Indonesian people. As the population grows, demand for rice will continue to rise, necessitating a significant increase in rice production. By 2024, rice demand is estimated to reach 31.2 million tons, with a population of 282.47 million and an average rice consumption of 81.23 kg/capita/year (BPS Indonesia, 2024). Although rice production in Indonesia in the last five years ranged from 53.63 to 55.27 million tons (BPS Indonesia, 2024), the challenge of increasing productivity and efficiency of land use remains a major concern for maintaining national food security.

Central Java Province is one of the largest rice production centers in Indonesia, contributing 17.48% to total national production. The harvested area in Central Java province ranges from 1.64 to 1.69 million hectares per year, with an average productivity of 5.52 tons per hectare (Central Java Province Statistics Agency, 2024). This productivity is still below the optimal potential that can be achieved by new superior varieties (VUB), which in ideal conditions can produce more than 10 tons per hectare (Jamil et al., 2016). The application of VUB can also increase the cropping index through the use of early maturing varieties and the application of more efficient cultivation

techniques (Hidayah et al., 2019; Muzamil et al., 2021), such as irrigation water management, proper fertilization, and effective cultivation practices (Zhu et al., 2024). In addition, kAvailability of seeds and the right planting time are also the keys to success in implementing VUB at the farmer level (Fadillah et al., 2020In Central Java, the application of superior varieties was able to increase crop yields by 13.67 to 53.42 percent compared to old varieties such as IR64 and Ciherang, which had an average productivity of 5.74 tons per hectare (Aristya and Romdon, 2019).

Tegal Regency, with 39,036 hectares of rice fields, ranks ninth in Central Java. Its contribution to rice production in 2023 was 322,591.57 tons, with an average productivity of 5.39 tons/ha (Tegal Regency Statistics Office, 2023), or lower than the productivity achieved by Central Java. Low production is caused by the low planting index (1.6) and the use of old varieties such asIR64 (released 1986), Ciherang (released 2000) and Situ Bagendit (released 2003)(Perdana et al., 2022).The introduction of VUB in Tegal Regency has been carried out since 2010, through various programs, such as variety testing, demonstration plots, and technology exhibitions. From 2017-2019, Inpari 42 and Inpari 43 were introduced through demonstration plots and technology exhibitions. Both varieties were able to increase productivity between 60.81-66.67% per hectare compared to commonly planted varieties such as Mekongga and Ciherang (Rondon et al., 2020However, the adoption of VUB by farmers remains low. Therefore, this study was conducted to identify factors influencing the development of new superior varieties in Tegal Regency and to formulate appropriate development strategies.

RESEARCH METHODS

The research was conducted from May to July 2023 in 10 sub-districts in Tegal Regency, Central Java Province, namely Margasari, Bojong, Balapulang, Lebaksiu, Pangkah, Dukuhwaru, Adiwerna, Dukuhturi, Kramat, and Kedungbanteng. The research locations were deliberately chosen because they were the locations of the government program, namely the pilot program for the new superior varieties Inpari 42 and Inpari 43 in 2017-2019.

The research method is carried out using a quantitative and qualitative approach concurrently or simultaneously.*Mixed method convergent parallel design* that is (Creswell & Clark 2018). The data collected is primary and secondary data. Primary data is collected through in-depth *interviews*, field observations, and surveys using questionnaires. Secondary data were obtained from relevant literature and reports from relevant agencies, including the Tegal Regency Agriculture and Food Security Service, the Provincial and Regency Statistics Offices, and other relevant agencies.

The respondent sample was determined purposely as many as 41 people, namely policy makers and users of VUB Inpari 42 and 43. The respondents were the Extension Section of the Food Security and Agriculture Service of Tegal Regency (1 person), Agricultural Extension Coordinators in 10 Districts (10 people), farmers implementing the VUB Inpari 42 demonstration plot (10 people), farmers implementing the VUB Inpari 43 demonstration plot (10 people) and consumers of VUB Inpari 42 and Inpari 43 rice (10 people).

Data analysis was carried out using SWOT (strengths, weaknesses, opportunities, and threats). SWOT analysis begins by identifying factors that are strengths and

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weaknesses as well as opportunities and threats.(Wang et al., 2015). In this study, the SWOT analysis focused on the development of VUB Inpari 42 and Inpari 43 in Tegal Regency. These factors were then tabulated into an internal factor evaluation matrix (IFAS) and an external factor evaluation matrix (EFAS) and given a rating weight and score for each indicator of strengths, weaknesses, opportunities, and threats.(Sonia et al., 2020). The IFAS and EFAS analysis procedures are presented in Table 1.

Table 1. *Internal Factors Analysis Summary (IFAS) dan External Factors Analysis Summary (EFAS)*

Internal Factors	Strategy	Weight	Rating	Weight x Rating	Comment
Strength					
Weaknesses					
Total					
External Factors	Strategy	Weight	Rating	Weight x Rating	Comment
Opportunity					
Threat					
Total					

After conducting the IFAS and EFAS analysis, the next step is to compile an internal external matrix (IE) as in Figure 1. This is used as a basis for formulating the strategy to be determined.

			Total Internal Strategy Factor Score			
			Strong	Rate - Rate	Weak	
			4.0	3.0	2.0	1.0
Total Score of External Strategy Factors	High	3.0	1 Growth	II Growth	III Shrinkage	
	Secondary	2.0	IV Growth	V Growth	VI Shrinkage	
				Stability		
	Low	1.0	VII Growth	VIII Growth	IX Liquidation	

Source: David and David (2019)
Figure 1. IE matrix to formulate a development strategy for VUB rice varieties Inpari 42 and Inpari 43 in Tegal Regency

After compiling the IFAS, EFAS, and IE matrices, the results were analyzed using a quantitative model, the SWOT matrix, to formulate a competitive strategy (Figure 2). The

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SWOT matrix is used to compile strategic factors. This matrix clearly illustrates how external opportunities and threats can be aligned with internal strengths and weaknesses.

IFAS EFAS	STRENGTHS (S) determine 5 – 10 internal strength factors	WEAKNESSES (W) determine 5 – 10 internal weakness factors
OPPORTUNITIES (O) determine 5 – 10 external opportunity factors	SO STRATEGY create strategies that use strengths to take advantage of opportunities.	WO STRATEGY create strategies that minimize weaknesses to take advantage of opportunities.
TREASURE (T) determine 5 – 10 external threat factors	ST STRATEGY create strategies that use strengths to overcome threats.	WT STRATEGY create strategies that minimize weaknesses and avoid threats.

Figure 2. SWOT matrix to determine strategic factors for the development of VUB rice Inpari 42 and Inpari 43 in Tegal Regency

RESULTS AND DISCUSSION

Profile Respondent

The study respondents consisted of 78.05% men and 21.95% women. They were generally in their productive age range, ranging from 30 to 73 years. A detailed respondent profile is presented in Table 2.

Table 2. Respondent profile by gender and age

No	Description	Description	Frequency	Percentage (%)
1	Gender	Man	32	78,05
		Woman	9	21,95
2	Age	30 – 40	8	19,5
		41 – 51	18	43,9
		52 – 62	12	29,3
		63 – 73	3	7,3

Source: Primary Data Analysis 2024

The gender-based analysis in this study provides important insights into the involvement of men and women in various stages of rice production, from decision-making to the implementation of new technologies. Understanding these different roles is crucial for formulating more inclusive and effective development strategies. The results

indicate that women are involved in farming operations, although their numbers are small (21.95%).

The role of women in the agricultural sector often goes unnoticed, even though they play a crucial role, particularly in rice production. Women are typically involved in various agricultural activities, such as planting, tending, and harvesting.Singh & Fareq, 2024). In addition, women often possess in-depth local knowledge of soil, water, and agronomic practices tailored to local conditions. However, a major challenge faced by women in many regions is limited access to resources, such as models, technology, and training, which are essential for optimizing their role in the utilization and development of new technologies. Furthermore, women are often underrepresented in formal agricultural organizations or farmer groups, which results in their voices being less heard in decision-making processes (Pin, 2003). This condition is exacerbated by social and economic changes where many men migrate to work outside the region, forcing women to manage their own farming businesses (Slavchevska et al., 2020).

The development of gender empowerment programs that provide women with greater access to training, technology, and other resources is needed. These efforts can increase women's participation in the agricultural sector. Collaboration with organizations that support women in agriculture can also strengthen networks and expand access to the latest information and technology, which in turn will accelerate the adoption of VUB and strengthen its overall development.(Ngango, 2022).

The respondent age group was dominated by those aged 41–51 years (43.9%), followed by those aged 52–62 years (29.3%). Respondents aged 41–62 years generally had sufficient farming experience, making them more capable of managing land effectively (Fanelli, 2023). However, at this age range, farmers begin to experience physical decline or limitations and tend to be less adaptive to new innovations (Brown et al., 2019). Respondents aged 30-40 years comprised 19.5%, this age group is generally more open to new innovations (John et al., (2023)which provides a higher opportunity for adoption of VUB Inpari 42 and Inpari 43. Although the number of farmers of this age is low, it is hoped that they can be the main driver for other older farmers to adopt new varieties ((Mgendi et al., 2022).

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IFAS and EFAS Matrix Analysis

The results of the IFAS matrix analysis on the development of new superior rice varieties (VUB) Inpari 42 and Inpari 43 in Tegal Regency revealed several key points related to internal strengths and weaknesses in supporting the adoption and application of superior rice varieties. The detailed IFAS analysis results are presented in Table 3.

Table 3. Weighted internal factors of the IFAS matrix

No	Internal strategic factors	Weight	Rating	Score
	Strength (S)			
1	High quality harvest results	0,12	4	0,46
2	Resistant to pests and diseases	0,08	2	0,15
3	The cultivation costs that relatively low	0,08	2	0,15
4	Easy availability of seeds	0,08	2	0,15
5	Easy cultivation process	0,12	3	0,35
6	Market availability and consumer demand	0,08	2	0,15
	Weaknesses (W)			
1	Limited knowledge and skills of farmers	0,12	4	0,46
2	Limited land availability	0,08	1	0,08
3	Fluctuations in rice prices in the market	0,08	1	0,08
4	Insufficient availability of agricultural facilities and infrastructure	0,08	3	0,23
5	Limited access to capital	0,12	2	0,23
	Total	1		2,50

Source: Primary Data Analysis 2024.

Based on the results of the respondents' assessment, the main strength priorities in the development of VUB rice Inpari 42 and Inpari 43 in Tegal Regency are high quality harvest results (score 0.46) and easy cultivation process (0.35), while the weaknesses in the development of VUB Inpari 42 and Inpari 43 are limited knowledge and skills of farmers (score 0.46), insufficient availability of agricultural facilities and infrastructure (score 0.23) and limited access to capital (score 0.23).

The development strength of VUB rice Inpari 42 and Inpari 43 in Tegal Regency

1. High quality harvest results

The main strength of the Inpari 42 and Inpari 43 rice varieties is their high-quality harvest, which respondents rated highly. This quality not only supports food security but also provides benefits for farmers. Inpari 42 and Inpari 43 are known for their high productivity and delicious-tasting rice (Rondon et al., 2022), making it a profitable option for farmers.

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2. Ease in the cultivation process

This convenience refers to relatively simple cultivation techniques that do not require special skills, allowing farmers of all skill levels to implement them. Ease of cultivation is an important aspect because it allows more farmers to use superior varieties without facing significant technical barriers.Alimudin et al., 2021). This strength is important to encourage wider adoption, especially for farmers with limited resources and technology.

Weaknesses in the development of VUB rice Inpari 42 and Inpari 43 in Tegal Regency

1. Limited knowledge and skills of farmers

The limitations in knowledge and skills referred to are farmers' lack of understanding of more advanced (modern) cultivation techniques and a lack of access to information. These limitations can hinder optimal adoption; farmers who lack adequate knowledge and skills will hesitate to implement new superior varieties.Veettil et al., 2021).

2. Insufficient availability of agricultural facilities and infrastructure

Facilities and infrastructure such as modern agricultural tools, good irrigation systems, availability of fertilizers and other supporting facilities are very important in ensuring the success of VUB rice cultivation (Fitriyah, 2021). If this infrastructure is not supportive and adequate, farmers will have difficulty optimizing the yield potential of VUB, which can lead to suboptimal productivity and increased production costs.

3. Limited access to capital

Limited access to capital is a major obstacle for small farmers to invest in new agricultural technologies, including VUB seeds, fertilizers, and necessary agricultural tools (Asnita et al., 2023Insufficient capital means farmers can only operate at limited capacity, ultimately resulting in suboptimal production. Lack of capital also makes it difficult for farmers to implement the innovations needed to improve agricultural efficiency.

External factors that respondents considered in developing VUB rice Inpari 42 and Inpari 43 in Tegal Regency are shown in Table 4.

Table 4. Weighted External Factors of EFAS Matrix

No	External Strategy Factors	Weight	Rating	Score
	Opportunity (O)			
1	Increasing the community's food needs	0,14	4	0,55
2	Increasing farmer awareness of the importance of rice productivity and	0,14	3	0,41

	quality			
3	The emergence of new technology in rice cultivation	0,09	3	0,27
4	Increasing demand for high-quality rice	0,09	2	0,18
5	Lifestyle changes for a healthier society	0,14	3	0,41
	Threat (T)			
1	Limited water resources for irrigation	0,09	1	0,09
2	The emergence of new pests and diseases that attack rice	0,09	4	0,36
3	Increase in prices of fertilizers and pesticides	0,14	3	0,41
4	Competition with other rice varieties	0,09	3	0,27
	Total	1		2,95

Source: Primary Data Analysis 2024

The results of the EFAS analysis, the priority opportunities for developing Inpari 42 and Inpari 43 rice in Tegal Regency are influenced by several factors, namely the increasing need for community food (score 0.55), increasing farmer awareness of the importance of rice productivity and quality (score 0.41), and changes in people's lifestyles to be healthier (score 0.41). Meanwhile, threats to the development of Inpari 42 and Inpari 43 rice are influenced by increasing prices of fertilizers and pesticides (score 0.41), the emergence of new pests and diseases that attack rice (score 0.36) and competition with other rice varieties (score 0.27).

Opportunities for developing VUB rice Inpari 42 and Inpari 43 in Tegal Regency

1. Increasing community food needs

This factor received the highest score, at 0.55, reflecting the increasing need for food in line with population growth. Developing the Inpari 42 and Inpari 43 rice varieties is the right choice, given their high productivity potential.Jamil et al., (2016)This situation presents a crucial opportunity for the adoption of new, superior varieties that are more efficient in meeting the growing need for food.

2. Increasing farmer awareness of the importance of rice productivity and quality

These results indicate that respondents are beginning to understand the importance of rice productivity and quality. This allows them to meet increasingly selective market demands, which in turn can increase their incomes.Maizunati, 2018). VUB Inpari 42 and Inpari 43 are known to have good quality rice with a high percentage of whole grain

(Yustina et al., 2024) apart from that, the VUB was assessed positively in terms of color, aroma, texture and taste (Prahardini et al., 2023; Purwaningsih et al., 2022) with superior quality harvest results (Yustina et al., 2024), making Inpari 42 and Inpari 43 have the opportunity to be more widely accepted by farmers who want to increase the competitiveness of rice production in the market.

3. Changes in people's lifestyles to be healthier

Changes in people's lifestyles towards healthier ones are driving demand for high-quality rice that is rich in nutritional value.Rahman et al., (2022)stated that the addition of 150 ppm paclobutrazol can improve the quality of brown rice, milled rice, and amylose content in VUB Inpari 42 and Inpari 43. In addition, the method and duration of storage of Inpari 42 and 43 rice can affect the organoleptic quality of cooked rice, such as taste and aroma (Purwaningsih et al., 2022). Therefore, these two varieties can be the right choice to meet the market demand for products that are not only high quality but also support a healthy lifestyle.

Threats to the development of VUB rice Inpari 42 and Inpari 43 in Tegal Regency.

1. Increase in prices of fertilizers and pesticides

Respondents felt that the price of fertilizer and pesticides continues to rise, both subsidized and non-subsidized fertilizers. In 2023, the price of subsidized fertilizers such as urea, phonska, and other fertilizers will increase, in addition to limited availability in agricultural kiosks. Fertilizers and pesticides are important inputs for the growth and production of Inpari 42 and Inpari 43. The increase in fertilizer and pesticide prices will affect the amount of fertilizer used by farmers, generally farmers reduce the amount/dose of fertilizer used, this can cause an insufficient supply of nutrients for rice plants, which ultimately affects growth and yields (Fahmid et al., 2022). In the long term, these conditions can affect food security, so policies such as subsidies or alternative agricultural practices are needed to increase productivity without relying solely on chemical inputs (Poernomo, 2018).

2. The emergence of new rice pests and diseases

Respondents' concerns regarding the use of VUB rice include the potential emergence of new, difficult-to-control pests and diseases. In principle, developing new rice varieties aims to increase productivity and resistance to biotic and abiotic stresses (Isnaini et al., 2023). However, changes in agricultural practices (Bello et al., 2021),

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ecological interactions with pests and diseases (Michler et al., 2024), as well as repeated planting of certain varieties (Simon et al., 2023), can accelerate the emergence of new pests and diseases that are more difficult to control. Therefore, effective monitoring and control of pests and diseases is essential to maintain stable crop yields. A thorough understanding of the patterns of emergence of new pests and diseases is essential in formulating more effective and efficient control measures (Jiang et al., 2024).

3. Competition with other rice varieties

Threats to the development of Inpari 42 and Inpari 43 rice varieties may arise from competition with other rice varieties or existing and established varieties in the local environment. Competition between these varieties can have a significant impact, particularly on market dynamics (Britwum et al., 2020Therefore, plant breeders need to consider the balance between increasing productivity and characteristics that meet market demand. Meanwhile, policymakers need to design appropriate interventions to encourage the adoption of superior rice varieties (Checco et al., 2023).

Internal and External Matrix Analysis (IE)

The IE matrix mapping results indicate that the development potential of the Inpari 42 and Inpari 43 rice varieties is in quadrant V (Figure 3). This indicates the importance of stronger efforts to address existing challenges.

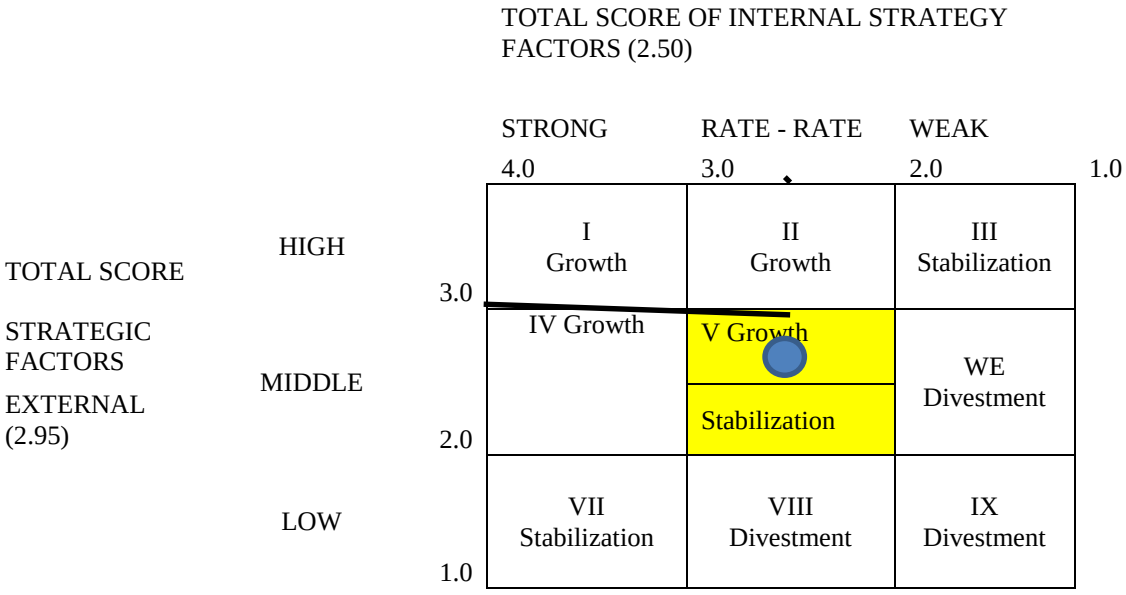

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Figure 3 IE Matrix
Source: Primary Data Analysis 2024

Quadrant V, or the growth and stabilization quadrant, highlights the importance of strategies that maximize growth potential while maintaining the stability of superior variety development. Detailed aspects of the key alternative strategies for developing Inpari 42 and Inpari 43 rice varieties in Tegal Regency are presented in Table 5.

Table 5. Alternative Development Strategy for VUB INpari 42 and Inpari 43 in Tegal Regency

INTERNAL **EXTERNAL**	**Strength (S)** 1. High quality harvest results 2. Resistant to pests and diseases 3. Relatively low cultivation costs 4. Easy availability of seeds 5. Easy cultivation process 6. Market availability and consumer demand	**Weaknesses (W)** 1. Limited knowledge and skills of farmers 2. Limited land availability 3. Fluctuations in rice prices on the market 4. Insufficient availability of agricultural facilities and infrastructure 5. Limited access to capital
Opportunity (O) 1. Increasing the community's food needs 2. Increasing farmer awareness of the importance of rice productivity and quality 3. The emergence of new technology in rice cultivation 4. Increasing demand for high-quality rice 5. Lifestyle changes for a healthier society	**S-O Strategy** 1. Optimizing high-quality harvests and resistance to pests and diseases to meet the community's food needs and the demand for high-quality rice. (S1, S2, O1, O4) 2. Utilizing new technologies in cultivation to increase productivity (S5,S3,O3) 3. Increasing Consumer Awareness and Demand for High-Quality Rice (S1, S6, O4, O5)	**W-O Strategy** 1. Conduct training for farmers to improve their knowledge and skills in rice cultivation (W1, O2, O3) 2. Partnership with agricultural infrastructure and facilities providers to optimize new technologies in rice cultivation) (W4, O3) 3. Increasing access to capital to meet the demand for high-quality rice (W3, O2, O4)

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Threat (T)	**S-T Strategy**	**W-T Strategy**
1. Limited water resources for irrigation 2. The emergence of new pests and diseases that attack rice 3. Increase in prices of fertilizers and pesticides 4. Competition with other rice varieties	1. Utilization of high quality harvest results to overcome competition with other varieties (S1, S6, T4) 2. Optimizing easy and pest-resistant cultivation processes to reduce the risk of new pests and diseases (S2, S5, T2) 3. Leveraging low cultivation costs and seed availability to address water resource constraints and rising input prices (S3, S4, T1, T3)	1. Increasing farmer capacity through technology training and extension programs (W1, W4, T2, T4). 2. Optimizing the use of land and water resources with efficient irrigation technology (W2,W4,T1). 3. Increasing access to capital through partnerships with financial institutions and agricultural subsidies (W5, T3).

Source: Primary Data Analysis 2024

Based on the results of the SWOT analysis, the priority strategies that can be taken for the development of VUB rice Inpari 42 and Inpari 43 in Tegal Regency are as follows;

1. The strategy of utilizing strengths by exploiting opportunities (Strengths-Opportunities/S-O) is to optimize high-quality harvests and resistance to pests and diseases to meet the community's food needs and the demand for high-quality rice. VUB Inpari 42 and Inpari 43 are included in the rice category.*green super rice*, has high yield potential, is resistant to pests and diseases and is able to adapt well to non-optimal environmental conditions (Ali et al., 2017). This potential can be increased through the application of better cultivation techniques such as the right combination of irrigation water, optimal fertilization, and effective cultivation practices (Zhu et al., 2024). These efforts are crucial in increasing rice production and quality, which in turn can meet the ever-increasing food demand, expand market reach, and enhance the competitiveness of superior rice at the national level.
2. The strategy to overcome weaknesses by exploiting opportunities (Weaknesses – Opportunities/W-O) is to partner with agricultural infrastructure providers to optimize the application of technology in rice cultivation. This strategy emphasizes improving farmers' access to infrastructure, including access to new or modern tools and technology, fertilizers, pesticides, and other infrastructure that supports rice farming.

With better access, the adoption of VUB Inpari 42 and Inpari 43 technology can be accelerated, thus optimizing the potential for increased productivity (Sanogo, et al., 20203).

3. The strategy of leveraging strengths to overcome or mitigate the impact of threats (Strengths-Threats/S-T) is to maximize high-quality harvests to face competition with other rice varieties. This strategy focuses on increasing the promotion of VUB Inpari 42 and Inpari 43 through various approaches. According toBello et al.,(2021) demonstration plots, training, and extension services can accelerate the adoption of VUB. In addition, ensuring the availability and sufficiency of seeds is an important factor that must be prioritized (Hoang & Nguyen, 2022Strengthening product branding by emphasizing the superior quality of the harvest can increase the competitiveness of VUB in the market, so that consumers will prefer Inpari 42 and Inpari 43 over other varieties.
4. The strategy for minimizing weaknesses and avoiding or reducing threats (Weaknesses – Threats) involves increasing farmer capacity through training and technology extension programs. Farmer training programs focus on several key components aimed at increasing agricultural productivity and sustainability, such as the use of modern agricultural technology, pest and disease management, water and land management practices, and the use of more efficient inputs.efficientThis training is facilitated through programs from the government, the private sector, and other stakeholders, utilizing facilitators such as agricultural extension workers, lecturers, and other facilitators.

CONCLUSION AND RECOMMENDATIONS

The SWOT analysis results indicate that the development of Inpari 42 and Inpari 43 rice VUBs in Tegal Regency has significant potential, particularly related to the advantages of high yield quality, resistance to pests and diseases, and relatively low cultivation costs. Existing opportunities, such as increasing public food needs, demand for high-quality rice, and the emergence of new technologies in rice cultivation, provide ample room for the development and adoption of these VUBs. However, there are weaknesses that need to be addressed, namely limited farmer knowledge and skills, limited land, and lack of access to infrastructure and capital. Furthermore, external

challenges, such as limited water resources and competition with other rice varieties, also need to be anticipated.

To optimize opportunities and address weaknesses and threats, a comprehensive strategy is needed, including increasing farmer access to technology, strengthening VUB promotion through demonstration plots and outreach, and optimizing collaboration with agricultural input providers. With this approach, the development potential of VUB Inpari 42 and Inpari 43 can be optimized to increase agricultural productivity and product competitiveness in regional and national markets.

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Author contributions: For articles with multiple authors, please list each author's contribution in a short paragraph. Author membership should be limited to those who have contributed, in addition to reading and approving the final manuscript.

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