



Analysis of the Production Process, Income, and Distribution of Rice Seeds from the Seed Management Unit (UPBS) at the Wawotobi Experimental Farm in Konawe Regency

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Abstract

This study aims to 1) Determine the production process of certified rice seeds at the Wawotobi experimental garden, 2) See the income obtained by the Wawotobi experimental garden from the sale of certified rice seeds during one harvest period, 3) Determine the distribution flow carried out by the Wawotobi experimental garden for harvested rice seeds. This study was conducted from July to December 2025. The determination of the research location was determined purposively. The research sample was determined purposively, namely the UPBS manager and technical staff directly involved in seed production and distribution activities. Data analysis was carried out using qualitative descriptive methods to describe the seed production and distribution process, as well as quantitative descriptive methods to analyze income through calculating the difference between revenue and production costs. The results of the study indicate that the certified rice seed production process at the UPBS Wawotobi Experimental Garden has been carried out in accordance with certification standards, starting from land preparation, selection of superior varieties, nurseries, planting, plant maintenance, roguing, harvesting, post-harvest processing, to laboratory testing and labeling. UPBS's revenue from the sale of certified rice seeds during a single harvest period is Rp20.185.938. Seed distribution is carried out through direct sales to farmers and breeders, as well as through grants to support government programs and the dissemination of new superior varieties

Keyword: *certified rice seeds, production process, income, distribution, UPBS*





INTRODUCTION

The agricultural sector plays a strategic role in economic development through its contribution to the Gross Regional Domestic Product (GRDP) and its role in providing food for the community. The continuous growth in population has led to an increase in national food demand, making it imperative to increase agricultural productivity. Sustainable agricultural development generally begins in rural areas as the main food production base (Uzzam, 2011). In this context, increasing the productivity of food crops, especially rice, is one of the main priorities in maintaining food security and regional economic stability.

One of the determining factors for successful rice production is the use of high-quality seeds. High-quality seeds have high variety purity, are disease-free, have a minimum germination rate of 90%, and are capable of producing uniform and productive plant growth. The use of high-quality seeds has been proven to provide more optimal yields compared to the use of seeds of uncertain quality (Andoko, 2002). In addition, the application of agricultural technology through the use of certified superior varieties is an important strategy in increasing food crop productivity. Seed certification provides quality assurance through field supervision and laboratory testing so that the seeds in circulation meet national quality standards (Suhendrata, 2008; Nindyasari, 2006).

In Southeast Sulawesi Province, the demand for rice seeds is relatively high, in line with the production area reaching more than 130 thousand hectares in recent years. Data shows that the area of rice production land fluctuated during the 2020–2024 period, influenced by climate factors, irrigation water availability, and the dynamics of farmers' planting patterns. These conditions have a direct impact on the demand for rice seeds, which reaches millions of kilograms each year. In order to meet this demand, regional seed institutions play an important role in providing certified superior seeds through a structured production and distribution system.

The Southeast Sulawesi Agricultural Research and Development Center (BPTP) plays a strategic role in the provision of high-quality seeds through its Seed Management Unit (UPBS), which produces source seeds and distribution seeds from various high-quality rice varieties. Seed production is carried out in stages, starting from source seeds to distribution seeds, which are then distributed to breeders and farmers commercially and through government programs. Seed distribution is also carried out at the Wawotobi Experimental Farm located in Konawe Regency as one of the rice seed development centers in the region. However, the dynamics of seed distribution are still influenced by farmers' economic conditions, market demand, and the effectiveness of the seed distribution system at the local level.

Previous studies have shown that the management of certified seed production requires





integrated planning, supervision, and distribution systems. Hartono et al. (2024) found that the management of certified seed production has been carried out systematically through production planning, quality control, and tiered supervision. Cahyaningrum et al. (2018) showed that the functions of seed production and marketing management have been implemented in a structured manner at PT. PERTANI (Persero). Meanwhile, Wulandari's (2017) research at PT Sang Hyang Seri (Persero) revealed that seed distribution still faces operational constraints such as late payments and stock limitations. Samrin et al.'s (2021) research also shows that the production of superior seeds in Southeast Sulawesi has been distributed to farmer groups, but has not been comprehensively studied in terms of production, income, and integrated distribution. These findings indicate that research on certified seed management is still partial and does not provide an integrated picture at the local seed source management level.

Based on these conditions, this research is important to comprehensively analyze the production, income, and distribution systems of certified rice seeds managed by the Wawotobi Experimental Garden UPBS. This integrated analysis is expected to provide a comprehensive picture of the effectiveness of certified seed management, strengthen the distribution system for quality seeds, and support increased rice productivity and farmer welfare in Southeast Sulawesi.

METHOD

This research was conducted at the Wawotobi Experimental Farm located in Lalosabila Village, Wawotobi District, Konawe Regency, Southeast Sulawesi Province from July 2025 to January 2026. The location was selected purposively because it is a rice seed source management unit that actively produces and distributes certified seeds through the Seed Source Management Unit (UPBS). The study used a case study approach with a qualitative descriptive method supported by quantitative data. The research subjects included the head of the center and technical staff involved in the production, distribution, and management of rice seed income. The data used consisted of primary and secondary data, where primary data was obtained through in-depth interviews and field observations, while secondary data was obtained from institutional documents, production reports, scientific literature, and other written sources. Data collection techniques were carried out through direct surveys at the research location, structured interviews using a set of questions, and documentation in the form of written notes, pictures, and archives of seed production activities.

The data analysis methods used in this study were quantitative and qualitative descriptive. Quantitative descriptive was used to calculate the income of the seed center in one planting





period. Qualitative descriptive was used to describe the rice seed production and distribution process.

- The production process, to determine the rice seed production process, can be done with a qualitative descriptive analysis of the rice seed production process at the Wawotobi experimental farm.
- Distribution, the distribution process can be analyzed using qualitative descriptive analysis, in which the distribution process can be described by the researcher.
- Income, according to Suratiyah (2015), income is the difference between total revenue (TR) and total cost (TC), with the following formula:

$$PD = TR - TC$$

Explanation:

PD: Revenue

TR: Total revenue (total receipts) TC: Total cost (total expenses)

RESULTS AND DISCUSSION

The Wawotobi Experimental Garden Seed Management Unit (UPBS) is a technical unit under the Southeast Sulawesi BPSIP that functions to produce, process, store, and distribute certified rice seeds to support the provision of quality seeds and accelerate the adoption of superior varieties in Konawe Regency. Seed production activities are carried out in accordance with national regulations through integrated management, starting from planting planning, cultivation, field supervision, to certification by the Food and Horticulture Seed Supervision and Certification Agency (BPSBTPH) to ensure the genetic, physical, and physiological quality of the seeds. The seeds produced are generally Foundation Seed (FS) and Stock Seed (SS) classes, which are then distributed commercially or as grants according to government program needs. In this study, the key informant was Yunus, S.St, as the UPBS manager responsible for planning, implementation, quality control, and seed distribution, supported by field technical staff, so that the data obtained comprehensively represented the operational and institutional conditions of the UPBS.

Certified Seed Production Process at the Wawotobi Experimental Farm

As a center for research and development of superior varieties, the Wawotobi Experimental Farm in Konawe Regency plays a strategic role in ensuring the availability of quality rice seeds through a standardized production process that refers to national food crop seed certification guidelines. Production activities not only include cultivation, but also selection,



purification, rouging, field supervision, as well as harvesting and post-harvest stages in accordance with genetic, physical, and physiological seed quality standards. Seed production activities are carried out by the Southeast Sulawesi BPSIP with coordination and supervision from the Food Crop and Horticulture Seed Certification and Supervision Agency (BPSBTPH) through breeding registration, field inspections during the growth phase, supervision of the processing and storage processes, and laboratory testing before the seeds are declared certified.

Table 1. Certified Seed Production Process at the Wawotobi Experimental Farm

No	Stage	Activity Description
1	Soil Preparation	Plowing >25 cm to improve soil structure and aeration (Soekartawi, 2016), flooding for 7–15 days to suppress weeds (Balitbangtan, 2019), followed by a second plowing and mudding to create loose and uniform planting media (Siregar and Hutapea, 2017).
2	Seedbed	Seedbed area $\pm 4\%$ of planting area ($\pm 400 \text{ m}^2/\text{ha}$) with seed requirement $\pm 25 \text{ kg}/\text{ha}$; beds 120 cm wide, $\pm 10 \text{ cm}$ high for good drainage and uniform seedlings (Balitbangtan, 2019; Makarim and Suhartatik, 2016; Ministry of Agriculture, 2020).
3	Seed Preparation	Inpari 30 variety; seeds are soaked for 24 hours and germinated for 48 hours for seedling uniformity; sowing density is $50 \text{ g}/\text{m}^2$ (Kartasapoetra, 1986; Nugraha and Mulyani, 2020; Rahayu and Sudjana, 2019; Rini and Pranoto, 2018).
4	Planting	Seedlings 15–21 days after sowing, 2:1 legowo planting system ($20 \times 20 \text{ cm}$; empty rows $40 \times 10 \text{ cm}$), 1–3 seedlings/hole, depth 1–3 cm; conditions 5–7 days after planting (Rahman and Siregar, 2019; Widiatmaka et al., 2018; Handayani and Putra, 2020; Prasetyo et al., 2017).
5	Fertilization	Dose per hectare: N 300 kg, P 120 kg, K 120 kg; applied in stages at 7–10 days after planting, 21 days after planting, and 42 days after planting for optimal absorption efficiency and yield (Balitbangtan; Ministry of Agriculture, 2020).
6	Crop Maintenance	Weeding at 15–21 days after sowing (DAS) and 30–35 DAS; selective herbicide at 1–3 months after sowing (MAS); irrigation according to phase (sprinkling, flooding 3–5 cm, alternating drying) to suppress weeds and diseases (Ministry of Agriculture, 2020).

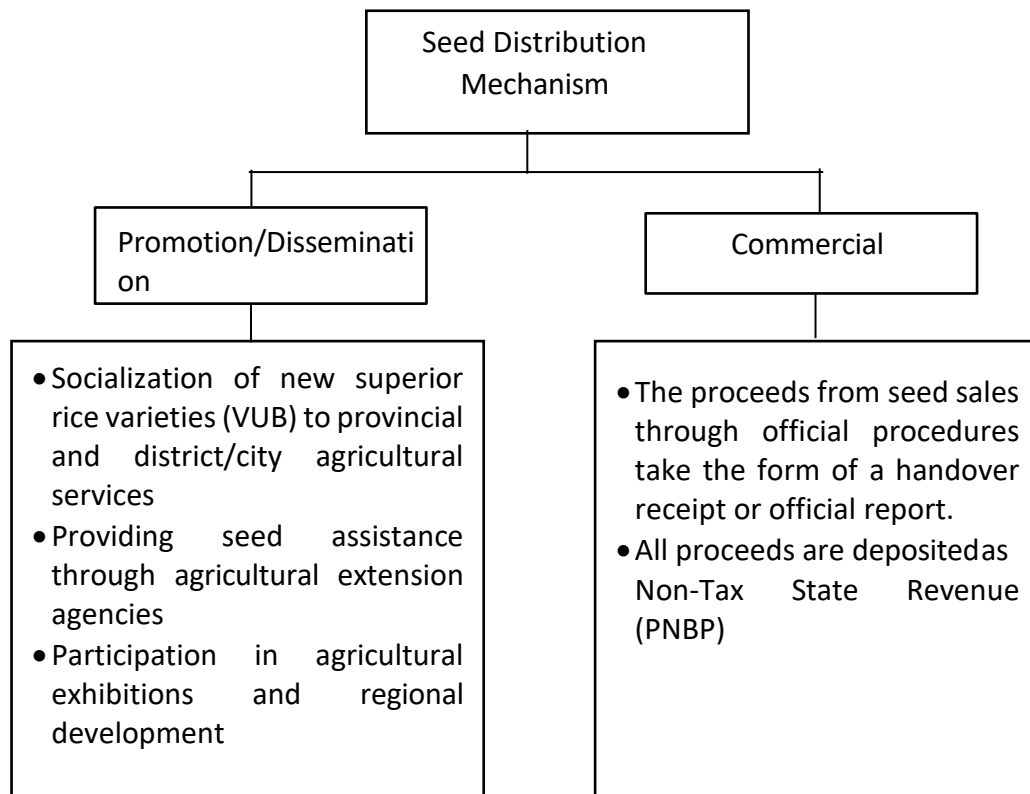
7	Rouging (Off-type Selection)	Three stages: maximum tillering (± 50 days after planting), flowering (80–90 days after planting), and maturity (100–110 days after planting) to maintain seed genetic purity.
8	Harvest	Conducted when 85–95% of the grains have turned yellow; generally at 100–110 HST with a moisture content of 20–25% and physiological maturity characteristics.
9	Processing	Cleaning of equipment, careful threshing, drying to 20–25% moisture content to maintain viability and suppress fungi (Kartasapoetra, 1986).
10	Supervision & Laboratory Testing	Supervised by BPSBTP; physical-physiological quality testing, certification, and labeling in accordance with Ministry of Agriculture Regulation No. 67/2016; minimum germination rate $\geq 80\%$ and moisture content as specified.

Based on Table 1, all stages of certified rice seed production carried out at the Wawotobi Experimental Farm not only follow technical cultivation procedures but also comply with the provisions stipulated in Regulation of the Minister of Agriculture of the Republic of Indonesia No. 67/Permentan/TP.010/10/2016. Compliance with these regulations ensures that the seeds produced meet the established quality standards and have legal and accountable quality.

Distribution Flow Carried Out by the Wawotobi Experimental Farm for Harvested Seeds

Based on the results of the study, the distribution of certified rice seeds produced at the Wawotobi Experimental Farm in Konawe Regency is still limited because most of the seeds are in the processing stage, which involves separating empty grains and impurities to meet quality standards. After being certified by the Food Crops and Horticulture Seed Certification and Monitoring Agency (BPSBTPH), the seeds undergo post-harvest stages including threshing, drying, cleaning, packaging, and labeling according to seed class before being distributed. The distribution mechanism prepared by the Seed Source Management Unit (UPBS) is carried out through two main channels, namely promotion/dissemination and commercial, targeting farmer groups, seed breeders, agricultural technical implementation units (UPT), and district/city agricultural offices in accordance with the needs of the rice production improvement program. The distribution volume is determined based on the number of seeds that pass certification, stock availability, target land area, and planting season requirements, through administrative procedures in the form of application submissions, stock and document verification, and handover reports to ensure transparency and accountability. Regulatory distribution refers to the provisions of food crop seed

certification, which requires seeds to meet quality standards before distribution, with the aim of ensuring the availability of quality seeds at the farmer level, increasing rice productivity, and supporting regional food security. An overview of the seed distribution mechanism is presented in a flowchart in Figure 1.



The Wawotobi Experimental Farm in Konawe Regency implements two seed distribution mechanisms after the seeds are declared ready for distribution, namely promotion/dissemination and commercialization. Under the promotion/dissemination mechanism, activities include socializing new superior varieties (VUB) to provincial and district/city agricultural services, distributing seed assistance through agricultural extension agencies, and participating in agricultural exhibitions and regional development. Seeds are distributed to farmers, farmer groups, government agencies, and educational and research institutions in accordance with requests and predetermined program allocations. This mechanism aims to accelerate the adoption of superior varieties while increasing the availability of quality seeds at the user level, especially in target seed development areas, thereby supporting the wider dissemination of rice cultivation technology innovations.

Meanwhile, commercial distribution is carried out through official procedures in the form of proof of delivery or official reports, and all sales proceeds are deposited as Non-Tax State Revenue (PNBP). Commercial distribution is generally intended for seed breeders and parties who need source seeds for further propagation activities, with selling prices determined based on seed class, production costs, and internal institutional policies. Operationally, the distribution process is managed by the Source Seed Management Unit (UPBS) with administrative records covering the amount of seeds, distribution objectives, and seed varieties and classes as a basis for evaluating distribution performance and calculating revenue. With this system, the Wawotobi Experimental Farm not only functions as a seed producer but also as an institution supporting seed development that ensures the sustainable availability of quality seeds for rice farming development in the local area.

Revenue Earned by the Wawotobi Experimental Farm from the Sale of Certified Rice Seeds in One Harvest Period

Revenue is a key indicator of the feasibility of certified rice seed production because it reflects the difference between total revenue and total costs during the production process. In this study, the Wawotobi Experimental Farm in Southeast Sulawesi plays a strategic role not only as a provider of quality seeds for farmers but also as a source of revenue that supports the operational sustainability of the seed production unit. Analysis of income per harvest season is important for assessing the efficiency of input use, the effectiveness of production management, and the potential profits generated, so that it can be used as a basis for determining seed production and distribution strategies for the next period. In this study, income was calculated from variable costs, fixed costs, total costs, receipts, and income.

Table 2. Details of Variable Costs in Producing High-Quality Seeds at the Wawotobi Experimental Farm/Planting Season/ha

No.	Description	Quantity (Unit)	Price (Rp/Unit)	Total (Rp)
1.	Inpari Seeds	25 kg	12,500	312,500
2.	Urea	150 kg	6,000	900,000
3.	NPK Phonska	250 kg	6,000	1,500,000
4.	KCl	100 kg	2,000	200,000
5.	Herbicide	2.5 L	150,000	200,000
6.	Insecticide	1 L	200,000	375,000
7.	Packaging Plastic			150,000

	25 kg	50 pieces	3,000	
8	Tarpaulin	1	500,000	500,000
9	Fuel	3.75 L	16,000	60,000
Total				4,197,500

Based on Table 2, the variable cost of producing high-quality rice seeds at the Wawotobi Experimental Farm reached IDR 4,197,500/ha per planting season, dominated by Phonska NPK fertilizer (IDR 1,500,000) and urea (IDR 900,000), reflecting the importance of nutrient management for uniform growth and genetic quality of seeds. The cost of Inpari variety seeds (25 kg; IDR 312,500) confirms the role of high-quality initial inputs in the seed system, while other components such as herbicides, insecticides, sacks, tarpaulins, and fuel—although smaller—remain crucial for smooth production, harvesting, and post-harvest activities. These findings are in line with Makarim et al. (2018) and Sudirman (2019), who stated that fertilizers and pesticides are the dominant cost components in certified seed production.

Table 3. Details of Labor Costs in Producing Quality Seeds at the Wawotobi Experimental Farm/Planting Season/ha

No.	Description	Amount
1	Land Area	8 ha
2	Labor Force	8 people
3	HOK/Ha	50.3 HOK
4	Wage/HOK	Rp. 100,000
5	Total Labor Wages	Rp. 5,030,000

Based on Table 3, in addition to production input costs, labor costs are a very influential component in rice seed production at the Wawotobi Experimental Farm, with a requirement of 50.3 HOK per hectare and a total cost of IDR 5,030,000 per planting season at a wage of IDR 100,000/HOK. The high labor requirement reflects the labor-intensive nature of seed production, especially during the planting, maintenance, selection (rouging), harvesting, and post-harvest stages, resulting in labor costs that exceed production input costs. This finding is in line with Siregar (2016), who states that certified seed production requires more intensive labor than consumption rice, and is supported by Setiadi et al. (2020), who show that the proportion of labor costs in seed production can reach more than 50% of total production costs in systems that still rely on manual labor.

Thus, the production cost structure of high-quality rice seeds at the Wawotobi Experimental Farm is dominated by labor and fertilization costs, so that increasing production efficiency mainly depends on effective labor management and the application of appropriate technology. These findings confirm that the success of seed production is not only determined by physical inputs, but also by labor efficiency and good production management.

Table 4. Details of Fixed Costs in Producing High-Quality Seeds at the Wawotobi Experimental Farm/Planting Season/ha

No.	Description	Depreciation (Rp)
1	Tractor	234,375
2.	<i>Seed Cleaner</i>	52,083
3.	Water Pump	6,250
4.	Bag Sewing Machine	8,750
5.	Sitting Scale	3,125
6.	Small Scale	625
7.	<i>Arco</i>	12,500
8.	Cart	3,125
9	Packaging <i>sealer</i>	4,688
10.	Small Planting Tools	417
11.	Hoes and Sickles	1,042
12.	<i>Motorized Sprayer</i>	2,083
13.	<i>Moisture Tester</i>	12,500
	Total	341,563

Based on Table 4, the total fixed cost of producing high-quality rice seeds at the Wawotobi Experimental Farm is IDR 341,563, which is dominated by tractor depreciation (IDR 234,375) as the main tool for soil cultivation, followed by seed cleaners (IDR 52,083) in the seed processing stage. other equipment such as water pumps, sack sewing machines, scales, sprayers, and moisture testers contribute less but are still important in maintaining quality according to certification standards. This pattern of mechanical equipment dominance is in line with Nurhapsa et al. (2020) that the largest fixed costs in rice farming generally come from high-investment equipment.

The accumulation of variable and fixed costs results in a total production cost of IDR 9,564,063 per hectare, while a production of 3,500 kg at a price of IDR 8,500/kg provides a

revenue of IDR 29,750,000 per planting season. The high revenue reflects the success of seed production and quality management, and confirms the concept of " " that production volume and selling price are the main determinants of farm revenue, as stated by Ibrahim (2021).

Table 5. Income Earned by the Wawotobi Experimental Farm in Producing High-Quality Seeds/Crop Season/8 ha

No	Description	Amount (IDR)
1	Variable Costs	9,222,500
2	Fixed Costs	341,563
3	Total Cost	9,564,063
4	Total Revenue	29,750,000
	Revenue	20,185,938

Based on Table 4, the total revenue (TR) obtained from the sale of certified rice seeds at the Wawotobi Experimental Farm was Rp29,750,000, with total production costs (TC) amounting to Rp9,564,063. The difference between revenue and production costs resulted in an income of IDR 20,185,938 in one planting season. This income value shows that the certified rice seed production business provides significant profits after all operational costs are covered.

This result is in line with the findings of Ibrahim (2021), who states that rice farming income is greatly influenced by farmers' ability to reduce production costs and maintain stable product selling prices. The relatively high net income at the Wawotobi Experimental Farm also shows that seed production is not only technically feasible but also financially profitable. According to Yuliani (2024), income analysis is an important indicator in assessing the feasibility of farming businesses, because income can be used to determine the extent to which a business is able to support the sustainability of production activities in the following period. Thus, an income of Rp19,844,375 proves that the Wawotobi Experimental Farm has good prospects in carrying out its seed production function while also providing tangible economic contributions.

CONCLUSION

Based on the research findings, it can be concluded that the production process of certified rice seeds at the Wawotobi experimental farm is carried out through systematic stages, starting from soil preparation, sowing, planting, fertilization, maintenance, selection (rouging), harvesting, to post-harvest processing. Each stage is carried out in accordance with the standards set by the seed supervisory agency to ensure the quality and genetic purity of the seeds.



Seed distribution at the Wawotobi Experimental Farm is carried out through two mechanisms, namely promotion/dissemination and commercial distribution. Promotional distribution is carried out by providing seed assistance to farmers through agricultural agencies, demonstration plots, exhibitions, and field trials. Meanwhile, commercial distribution is carried out through direct sales to farmers, breeders, and related institutions.

The results of the study show that the revenue from the sale of 3,500 kg of rice seeds at a price of IDR 8,500/kg reached IDR 29,750,000. Meanwhile, the total production cost, consisting of variable costs of IDR 9,222,500 and fixed costs (depreciation) of IDR 341,563, resulted in a total cost of IDR 9,564,063. Thus, the income earned by the Wawotobi experimental farm was IDR 20,185,938.

It is recommended that farmers make greater use of certified rice seeds from the Wawotobi Experimental Farm because they have undergone quality control, thereby potentially increasing productivity and income, while optimizing the efficient use of production inputs. The local government, particularly the agricultural office in Southeast Sulawesi, is expected to strengthen its support for seed development through the facilitation of production facilities, technical assistance, price stabilization, and the expansion of promotion of superior varieties. Meanwhile, researchers are advised to expand their studies on aspects of efficiency, seed usage comparisons, and distribution chain and market dynamics analysis to support more comprehensive seed business development.

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