ANALYSIS OF THE SEED PRODUCTION SYSTEM IN IMPROVING THE QUALITY AND YIELD OF MELONS AT PT ROYAL AGRO PERSADA

Cinthiya Putri Kartikasari[1], Retna Dewi Lestari[2], Bimoseno Sepfrian [3]
Agribusiness Departement[1], Faculty of Science and Technology[2], Universitas Duta Bangsa Surakarta[3]
*Correspondence Email : 220310008@mhs.udb.ac.id

ABSTRACT

Melon seed production requires an integrated production system from cultivation and post-harvest handling to seed quality testing to produce high-quality seeds. PT Royal Agro Persada has been developing its melon seed production, but a study is needed on the implementation of its production system to determine whether the production processes are effective in improving seed quality. This study aims to analyze the melon seed production system implemented at PT Royal Agro Persada. The research method used is a qualitative descriptive approach, with data collected through interviews and documentation. Data analysis was conducted by describing the stages of the seed production system, which include the cultivation, post-harvest, and seed quality testing subsystems. The results show that the melon seed production system at PT Royal Agro Persada consists of three main subsystems. The cultivation subsystem includes parent plant selection, seedling propagation, NFT hydroponic cultivation, nutrient management, pollination, maintenance, and harvesting. The post-harvest subsystem includes seed extraction, fermentation, washing, drying, and cleaning. The quality testing subsystem includes sampling, testing for moisture content, physical purity, and germination rate in accordance with Ministry of Agriculture Regulation No. 380/Kpts/HK.150/D/IX/2023. The implementation of these three subsystems demonstrates that the melon seed production process has been carried out systematically to maintain.

KEYWORDS Production System, Melon Seeds, Cultivation, Post-Harvest, Seed Quality.

This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International

INTRODUCTION

Melons (*Cucumis melo L.*) are high value horticultural crops with great potential for development through the application of modern cultivation technologies, one of which is the hydroponic system in greenhouses. The success of melon production is influenced not only by cultivation techniques but is also heavily determined by the quality of production inputs, particularly seeds. High quality seeds play a crucial role in determining plant growth, productivity, and crop quality because they carry genetic, physiological, and physical traits that influence cultivation success. High-quality seeds produced through an integrated production system including the selection of superior parent plants, environmental control, and certification can increase germination rates to 90% or higher, reduce losses due to growth failure, and produce melons of uniform size and sweet flavor, thereby supporting the efficiency of commercial production (Khafiizhi *et al*., 2024).

The horticultural seed industry continues to grow in line with the increasing demand for high-quality, superior seeds. Successful seed production requires an integrated production system, ranging from the selection of source seeds, the cultivation of parent plants, harvesting, post harvest processing, quality testing, to seed certification. PT Royal Agro Persada is a company engaged in the development and production of horticultural seeds, including melon seeds. However, in the production of melon seeds at PT Royal Agro Persada, issues such as inconsistent seed quality across production seasons have been identified. Based on seed quality test results over three production seasons, several varieties showed germination rates and seed purity that did not meet the companys standards. These findings indicate that the seed production process is not yet fully optimized and are likely related to the implementation of production stages, ranging from cultivation and post-harvest processing to seed quality testing.

This inconsistency in seed quality underscores the need to analyze the seed production system to assess the adequacy of each production stage and identify areas for improvement. Therefore, this study aims to analyze the seed production system to improve the quality and productivity of melons at PT Royal Agro Persada, thereby providing recommendations for improvements to produce higher-quality and more consistent melon seeds.

RESEARCH METHOD

This study was conducted at PT Royal Agro Persada, located at Jl. Purwomartani No. 13, Bromonilan, Purwomartani, Kalasan Subdistrict, Sleman Regency, Special Region of Yogyakarta. The research location was selected using a purposive sampling method, which is a technique for determining a location based on specific considerations (Sugiyono, 2022). The rationale is that the company is engaged in the production and development of horticultural seeds and has a seed quality testing laboratory that meets the ISO 9001:2015 standard. The study was conducted over approximately three months, from May to July 2026. The study population consisted of 29 employees involved in melon seed production that is, the group of individuals with specific characteristics identified by the researcher for study. Given the relatively small population size, sampling was conducted using a census

or total sampling technique, so that all members of the population served as research respondents (Sugiyono, 2022).

This study employs a qualitative descriptive method. Descriptive analysis is a type of analysis conducted to obtain a general overview of the characteristics of the data as they are, without drawing general conclusions (Sugiyono, 2022). This method was chosen because the research question aims to identify and describe in detail how the melon seed production system operates. This study uses both primary and secondary data sources. According to Sulung & Muspawi, (2024) Primary data is the main source of information collected directly by researchers during the research process whether from individuals or groups thereby reducing the likelihood of misinterpretation or distortion of information. The primary data used in this study was obtained from interviews with employees of PT Royal Agro Persada using a questionnaire. According to Haifa *et al*., (2025) Secondary data is a source of research data obtained indirectly through an intermediary. The secondary data used consists of data from within the company, articles, research journals, and books relevant to the research topic.

RESULT AND DISCUSSION

A. Respondent Characteristics

The characteristics of the respondents in this study consist of 29 employees involved in the melon seed production system at PT Royal Agro Persada. By position/division, the respondents were predominantly field workers (41.4%) and warehouse workers (37.9%), while the remainder held managerial and supervisory positions, namely Production Manager, QC Supervisor, Field Supervisor, Warehouse Supervisor, and Seed Quality Analyst. By gender, the majority of respondents were male (79.3%), while females accounted for 20.7%, reflecting the workforce composition in seed production activities, which are dominated by operational work in the field and warehouse.

In terms of education level, the majority of respondents were vocational high school (SMK) graduates (69.0%), followed by college graduates (13.8%), while the remainder had completed elementary, junior high, or senior high school. Based on length of service, respondents were relatively evenly distributed across the categories of less than 2 years (34.5%), 2–5 years (34.5%), and more than 5 years (31.0%), indicating a mix of both new and experienced workers. By age, the majority of respondents were in the productive age group of 25–35 years (48.3%), followed by those under 25 years (24.1%), 36–45 years (17.2%), and over 45 years (10.3%). These characteristics indicate that the respondents have diverse backgrounds relevant to the implementation of the melon seed production system, enabling them to provide information representative of the research objectives.

B. Seed Production System at PT Royal Agro Persada

The melon seed production system at PT Royal Agro Persada consists of a series of activities designed to produce high-quality seeds that meet stable and consistent quality standards. Each stage of the production system is carried out continuously with the aim of producing melon seeds with good physical, physiological, and genetic qualities. Although the melon seeds produced are still in the development stage and have not yet been mass-marketed, the production process is still carried out with a focus on

quality control at every stage. Based on interviews with the QC Supervisor, Field Supervisor, Warehouse Supervisor, and the Seed Quality Analyst, it was found that the melon seed production system is implemented in accordance with Ministry of Agriculture Regulation No. 23 of 2021 on Horticultural Seed Production, the standards of the International Seed Testing Association (ISTA), and Ministry of Agriculture of the Republic of Indonesia Decision No. 380/Kpts/HK.150/D/IX/2023 on Technical Guidelines for Horticultural Seed Certification. The seed production system at PT Royal Agro Persada consists of three interrelated subsystems: the cultivation subsystem, the post-harvest subsystem, and the seed quality testing subsystem. These three subsystems form an integrated process that cannot be separated because the output of each subsystem serves as input for the next subsystem; thus, the success of the production system is determined by the integration of all subsystems, not by any single stage alone. A discussion of the melon seed production subsystem at PT Royal Agro Persada is shown in Figure 1.1



Figure 1.1 Melon Seed Production Subsystem at PT Royal Agro Persada
Data Source: Processed Primary Data, 2026

1. Aquaculture Subsystem

The first subsystem is cultivation, which refers to a series of organized activities focused on managing crop production with the aim of producing agricultural products (Wahditiya *et al*., 2025). This subsystem is the first stage in the seed production system at PT Royal Agro Persada, encompassing a series of activities from the selection of parent plants to the harvesting of fruit to be used as a seed source. This subsystem is carried out in a greenhouse using the Nutrient Film Technique (NFT) hydroponic system, allowing for more optimal control of the plants' environmental conditions. Cultivation activities include greenhouse preparation, planting, plant maintenance, irrigation, fertilization, pest and disease control, pollination, and harvesting.

The primary output of the cultivation subsystem is harvest-ready melons that have reached the appropriate level of physiological ripeness, as this condition significantly affects the viability, vigor, and quality of the seeds that will be produced in the next stage; seed viability and vigor are influenced by the fruit's level of ripeness at harvest and post-harvest curing conditions (Gafur, 2024). The results of the observation show that the implementation of the cultivation subsystem involves a clear division of tasks between the Plantation Division and the Plantation Supervisor, who are responsible for all cultivation activities, and the QC Supervisor, who oversees compliance of cultivation practices with the company's operational standards. The melon cultivation subsystem at PT Royal Agro Persada is illustrated in Figure 1.2



Figure 1.2 Melon Seed Production Subsystem at PT Royal Agro Persada
Data Source: Primary Data, 2026

2. Post Harvest Subsystem

The second subsystem is the post-harvest subsystem. The post-harvest processing of melon seeds at PT Royal Agro Persada includes seed extraction, seed fermentation and washing, seed drying, and seed cleaning before the seeds enter the quality testing stage. The post-harvest subsystem is a series of activities aimed at processing harvested fruit into test-ready seeds while maintaining the physical, physiological, and genetic quality of the seeds. This is in line with Fibriani *et al*., (2026). Post harvest processing is a series of steps aimed at maintaining the physiological, physical, and genetic quality of seeds from harvest until they are ready for use or storage.

The post-harvest subsystem at PT Royal Agro Persada consists of several sequential stages, namely fruit ripening, seed extraction, seed washing, seed drying, seed sorting, seed packaging, and temporary storage before the seeds enter the seed quality testing stage. Ministry of Agriculture Regulation No. 23 of 2021 on Horticultural Seed Production stipulates that post-harvest handling must be carried out in accordance with established procedures to ensure that seeds meet quality standards prior to certification.

3. Seed Quality Testing Subsystem

This subsystem receives processed seeds from the post-harvest subsystem as input, after which quality testing is conducted in accordance with the company's operational standards to determine whether the seeds meet the established quality requirements. This is in line with Messakh *et al*., (2025) Seed quality testing is a crucial stage in the seed production system to ensure that the seeds produced meet quality standards before being distributed.

Seed quality testing at PT Royal Agro Persada consists of three components: seed purity testing, moisture content testing, and seed germination rate testing. This is also in accordance with the Decree of the Minister of Agriculture of the Republic of Indonesia No. 380/Kpts/HK. 150/D/IX/2023

regarding Technical Guidelines for Horticultural Seed Certification and the 2016 Ministry of Agriculture of the Republic of Indonesia Seed Laboratory Quality Testing Guidelines, which state that seed quality testing is divided into three stages: moisture content determination, purity analysis, and germination testing or analysis.

The test results serve as the basis for deciding the status of the seeds; that is, the seeds are deemed suitable for storage, further processing, or distribution as high-quality seeds if all quality parameters meet the company's standards. According to Zainal *et al*., (2023) This seed quality verification and validation process demonstrates that the seeds used have a high success rate and ensures that the final results meet expectations. The melon seed quality testing subsystem is shown in Figure 1.3



Figure 1.3 Melon Seed Quality Testing Subsystem
Data Source: Primary Data, 2026

CONCLUSION

The melon seed production system at PT Royal Agro Persada consists of three main, interrelated subsystems: the cultivation subsystem, the post-harvest subsystem, and the seed quality testing subsystem. The cultivation subsystem involves the selection of parent plants, seedling propagation, NFT hydroponic cultivation, nutrient management, pollination, plant maintenance, and harvesting of fruit at physiological maturity. The post-harvest subsystem includes seed extraction, fermentation and washing, drying, and seed cleaning to produce clean seeds with a moisture content that meets storage standards. The seed quality testing subsystem involves seed sampling, moisture content testing, physical purity analysis, and germination testing.

REFERENCES

Fibriani, S., Yanti, Y. D., Yuniati, S., Barus, R. A. K., Prahmawati, E., Amir, K., Anggrali, R., Sarijan, A., Dare, D., & Ningsih, R. M. (2026). *Teknologi Benih Untuk Pertanian Berkelanjutan* (edisi Ke-1). GET PRESS INDONESIA.

Gafur, M. A. (2024). *Pengaruh Tingkat Kemasakan dan Pemeraman Buah Tomat (Lycopersicum esculentum Mill.) Terhadap Viabilitas dan Vigor Benih*. *13*(1), 17–25.

Haifa, N. M., Nabilla, I., Rahmatika, V., & Hidayatullah, R. (2025). Identifikasi Variabel Penelitian, Jenis Sumber Data dalam Penelitian Pendidikan. *Jurnal Pendidikan Dan Bahasa*, *2*(2), 256–270.

Keputusan Menteri Pertanian RI No 380/Kpts/HK.150/D/IX/2023 tentang Teknis Sertifikasi Benih Hortikultura. 2026.

Khafiizhi, M., Utama, P., Roidelindho, K., & Millah, Z. (2024). Keragaman Morfologi , Hasil dan Kualitas Hasil Lima Populasi Melon (Cucumis melo L .) Hasil Topcross (The Variation of Morphology , Yield and Yield Quality of Five Melon Population from Topcross). *Jurnal Zuriat*, *35*(September), 13–22. https://doi.org/10.24198/zuriat.v

Messakh, O. S., Kurniasari, L., Triati, D., Ahmad, F., Tefa, A., Fauzan, R., Rahmawan, H., Prashana, A. V., Wahyuni, W., Anugrah, M., Wulandari, S., Sitorus, R., Ramli, & Nugraha, L. A. (2025). *Ilmu dan Teknologi Benih* (Edisi ke 1). Azzia Karya Bersama.

Pedoman Uji Mutu Laboratorium Benih Kementerian Pertanian Republik Indonesia 2016. 2026

Sugiyono. (2022). *Metode Penelitian Kuantitatif Kualitatif dan R&D* (Cetak1.Edi). CV Alfabeta.

Sulung, U., & Muspawi, M. (2024). MEMAHAMI SUMBER DATA PENELITIAN : PRIMER, SEKUNDER, DAN TERSIER. *Jurnal Edu ResearchIndonesian Institute For Corporate Learning And Studies (IICLS)*, *2*(2), 28–33.

Wahditiya, A. A., Sutopo, Tebai, N., Fahmi, D. A., Leilasariyanti, Y., Sari, R. A. P., Rahayu, W. N., Widayanti, A. V., Ramadhani, M., Maulida, D. L., Hariputra, A., Wijayati, P. D., & Sari, P. N. (2025). *Manajemen Agribisnis: Konsep, Strategi, dam Implementasi* (Edisi ke-1). Yayasan Tri Edukasi Ilmiah.

Zainal, M. A., Abidin, I. A., Ria Megasari, Arsi, Refa Firgiyanto, A. A., & Dian Utami Zainuddin, T. A. (2023). *Teknologi dan Produksi benih* (Edisi ke-1). Yayasan Kita Menulis.