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Enhancing Sweet Corn (Zea mays Saccharata) Production through Standard Operating Procedure-based Cultivation Techniques

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Abstract. Sweet corn (Zea mays Saccharata) is a promising legume commodity suitable for agricultural business ventures. The prospect of developing sweet corn farming is bright, aiming to improve farmers' income, enhance their welfare, and contribute to national revenue. In Sidera Village, farming practices for sweet corn are predominantly conventional, lacking adherence to principles of sustainable development, characterized by the use of inorganic fertilizers and chemical pesticides not in accordance with recommendations. A community engagement program aims to assist farmers in implementing cultivation techniques following Standard Operating Procedures (SOP) to boost sweet corn production. Specific targets include enhancing farmers' knowledge and skills to increase sweet corn productivity, addressing healthy food provision and income elevation. The program is conducted in Sidera Village, Sigi Biromaru Sub-District, collaborating with the Tunas Sejahtera farmer group as partners. Methods employed encompass training, practical sessions, technology package demonstrations, pilot plots, participatory mentoring, and coaching. Training covers standardized corn cultivation systems, organic granular and liquid fertilizer development, and bio-rational pesticides. Subsequently, practical sessions, demonstrations, and pilot plot cultivation according to SOP are carried out. The program's outcome includes a 40% increase in participants' knowledge and skills in optimal sweet corn cultivation techniques, with pilot plot yields reaching 7 tons/ha of good-quality corn, thus holding significant economic value for community income enhancement.

Keywords: Sweet corn, organic fertilizer, botanical pesticide, standard operating procedure

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INTRODUCTION

Sidera Village, situated in the Sigi Biromaru Sub-District, is renowned as one of the agricultural hubs in Sigi Regency. Positioned just 19 km south of Palu City, the village boasts high community mobility. With an elevation of 100 meters above sea level, it is conducive to cultivating various food crops, orchards, and vegetables. Its population, numbering 2,236 individuals, predominantly consists of farmers cultivating approximately 412 hectares of land.

The "Tunas Sejahtera" farmer group in Sidera Village, comprising 20 members, actively engages in sweet corn (Zea mays Saccharata) farming. However, their practices remain conventional, disregarding principles of sustainable development, notably through the use of inorganic fertilizers and chemical pesticides not recommended by experts.

The inappropriate use of synthetic fertilizers and pesticides can lead to decreased productivity and adverse ecological and health impacts, ultimately reducing farmers' income (Lasmini et al., 2022). To mitigate these issues, transitioning to sustainable farming practices is imperative. Such practices integrate environmental, socioeconomic, and community aspects, aiming for economic profitability, social benefits for farming families and communities, and sustainable environmental conservation (FAO, 2015; Sari et al., 2022).

Good Agricultural Practices (GAP) serve as the minimum requirement for sustainable farming. GAP guidelines encompass environmentally friendly technological implementations, health and welfare safeguards for workers, pest and disease prevention, and traceability principles (Rahmat & Dwirayani, 2019). Implementing GAP offers solutions to agricultural challenges, enhancing long-term agricultural productivity (Sukmadjaya, 2019), and improving farmers' productivity, income, and welfare (Krasachat, 2023; Nahraeni et al., 2020).

Thus, this community engagement program introduces various technologies aimed at enhancing productivity and increasing sweet corn production through the adoption of Standard Operating Procedure (SOP)-based cultivation techniques. These include planting, maintenance, fertilization, pest and disease control, and harvesting. SOP aims to streamline processes and minimize errors (Poerwanto, 2013). The community engagement program aims to assist farmers in applying cultivation techniques following SOP to enhance sweet corn (Z. mays Saccharata) production.

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PROBLEM

The issues faced by the partner farmer group in Sidera Village regarding sweet corn (Z. mays Saccharata) cultivation activities are: Decreasing productivity compared to potential yield, insufficient provision of inputs within a planting season due to perceived high costs, frequent infestations of corn earworms leading to unproductive plants, and the predominantly conventional farming practices among group members.

As per the agreement between the community engagement program implementation team and the farmer group, several priority issues have been identified for immediate intervention: Low community knowledge can be addressed through various training sessions related to agricultural practices; declining productivity of sweet corn can be tackled by implementing good agriculture practices according to sweet corn cultivation SOPs; insufficient input provision within a planting season due to cost concerns can be mitigated by promoting the development of granular organic fertilizers and liquid organic fertilizers (LOF); and frequent corn earworm infestations causing plant unproductivity can be addressed through the formulation of botanical pesticides.

METHOD

To support the implementation of the community engagement program, several methods/approaches are utilized, namely: (a) Counseling and training, aimed at enhancing knowledge, attitudes, and behaviors among the target groups through adult learning approaches; (b) Technology introduction, conducted through pilot plot experiments and technology demonstrations; and (c) Group empowerment, carried out through mentoring methods (Vintarno et al., 2019). Questions related to the theme of engagement are provided at the beginning and end of the activities.

RESULT AND DISCUSSION

A. Implementation of Extension and Training Sessions

Extension and training sessions on cultivation techniques following Standard Operating Procedures (SOP) to enhance sweet corn (Z. mays Saccharata) production are conducted for the Tunas Sejahtera farmer group. Fifteen members of the farmer group and five representatives from the Bulupountu Jaya community, including the head of UPT, youth groups, and women's groups, attend the sessions. Topics covered during the sessions include: corn planting techniques, development and application of organic fertilizers, bio-rational pesticide development, pest and disease control methods, and plant maintenance. Through

these sessions, farmers' dependence on purchased inputs is aimed to be reduced by promoting self-development, thereby improving household economies. This initiative aligns with Nuraeni *et al.* (2013), highlighting the adverse effects of farmer dependency on seeds, organic fertilizers, and chemical pesticides on their livelihoods as primary food producers. Resource persons for the sessions include the head and members of the implementation team, as well as Dr. Asrul, S.P., M.P., an expert in pest and disease control from the Faculty of Agriculture, Univerrsitas Tadulako.

During the extension and training sessions, material is delivered through lecture-style presentations (see Figure 1) and supplemented with videos showcasing corn cultivation techniques. The sessions conclude with discussions and problem-solving sessions addressing challenges faced by corn farmers in the Bulupountu area.

Fig 1. Implementation of counseling and training sessions.

B. Implementation of Technology Demonstration Plots

Technology demonstration plots focus on implementing corn planting methods in accordance with standard operating procedures for corn cultivation. This includes land preparation techniques, row alignment, seed planting methods, and maintenance practices. The implementation team demonstrates these techniques to participating community members, followed by hands-on practice by farmers.

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The demonstration plots take place on a farmer's land in UPT Bulupountu Jaya. Sweet corn is cultivated in these technology demonstration plots (see Figure 2).

Fig 2. Sweet corn cultivation demonstration plot.

The cultivation technology for sweet corn in accordance with Good Agricultural Practices (GAP) includes: the use of labeled seeds, recommended planting methods, maintenance, fertilization, pest and disease control, and harvesting techniques (Agustina et al., 2019; Vaughan, 2018), compared to conventional methods. The seed variety used in the demonstration plots is selected based on participants' preferences, namely the Bonanza F1 variety, known for its potential yield of 14-18 tons/ha.

The standard operational procedures for cultivating sweet corn in dry land applied in the demonstration plot area include: planting seeds at a spacing of 75 x 25 cm, followed by maintenance after seedlings emerge. Maintenance activities at 7-15 days after planting (DAP) include thinning and application of 150 kg/ha of ammonium sulfate (ZA) and 300 kg/ha of SP-36. At 25-30 DAP, weeding, hilling, and application of 5 grains of Furadan 3G insecticide per plant shoot are carried out. Potassium chloride (KCl) fertilizer is applied at a rate of 50 kg/ha at 40-45 DAP, and ear selection is performed at 50-55 DAP. Sweet corn is harvested at 75-80 DAP.

Fig 3. Sweet corn cultivation demonstration plot following GAP standards.

In implementing the technology demonstration plots for corn cultivation following SOPs, farmers are enthusiastic about adopting the cultivation technology guided by the community engagement team. However, farmers face challenges in obtaining quality seeds as they are unable to develop sweet corn seeds themselves, as stated by Wijaya et al. (2021) and Baswarsiati & Tafakresnanto (2019). Challenges in GAP implementation include the use of low-quality seeds, excessive fertilizer use, improper planting, and harvesting practices that do not meet quality management standards.

Pre-test and post-test results for the 20 participants involved in the GAP-standard corn cultivation show that before the community engagement activities, 7 participants (35%) were aware of SOPs, while the rest were not. After the activities, the number of participants aware of SOPs increased to 15 (75%), indicating a 40% increase in knowledge among participants. Corn production in the demonstration plots yielded approximately 7 tons/ha, equivalent to half of the potential yield of 14-18 tons/ha.

CONCLUSION

Community engagement activities enhance participants' knowledge and skills in developing compost fertilizers and botanical pesticides. Good agricultural practice for sweet corn cultivation can be adopted by farmers following technical guidance from the community engagement team, covering land preparation to cultivation and maintenance techniques. Evaluation of the community engagement activities indicates a 40% increase in participants' knowledge of good corn cultivation practices.

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