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# Improving the Skills of Siamese Orange (*Citrus nobilis* Lour) Farmers in Belantih Village, Bangli, to Prevent Fruit Loss through Organic Cultivation Technology

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**A B S T R A C T**

Action Research Program for Regional Leading Product Development was conducted in Belantih Village, Bangli. This activity aims to improve the skills of citrus farmers in Belantih Village, Bangli, to prevent fruit loss through organic cultivation technology. Participants are administrators and members of the Dharma Kriya farmer group. Implementation of activities using a practice-based learning approach. The method of implementing the activity is through counseling and mentoring as well as technology transfer to prevent flower and fruit loss by applying techniques for pruning twigs, water shoots and unproductive branches, as well as administering NPK Guano fertilizer at a dose of 500 g/tree, and spraying Agrodyke fertilizer to all parts of the plant at a dose of 500 g/tree. 40 g/l of water. The results of the counseling and mentoring showed that by implementing the practice-based learning method, they stated that they could easily understand and understand how to do prevention technology so that flowers and fruit do not fall off easily. Based on the results of the tabulation of the questionnaire given, it was found that 92.00% of the 25 respondents stated that they were delighted, and those who expressed satisfaction were 8.00% with the PPPUD service activities carried out, which means that there were no respondents who expressed dissatisfaction or dissatisfaction. 96.00% of respondents said they were very interested in practicing flower and fruit loss prevention technology in their gardens, and the remaining 4.00% said they were interested. This means that 100% of the participants want to implement it in their gardens.

## 1. INTRODUCTION

### *1.1. Research Background*

Siamese oranges are among the leading fruits of Bangli Regency and Belantih Village is one of the central villages of citrus production in Kintamani District, Bangli, so it is not surprising that citrus plants or trees dominate the plantations of the local population [9]. The "Dharma Kriya" Farmer Group, whose members consist of orange farmers, is very important in the cultivation and agribusiness of oranges. The problem is, even though it has the status of an orange producing center, oranges have not been able to provide welfare for their people because fruit production is still very low. In terms of fruit quality, it is also very low, such as small fruits, many fruit skins are *burik-burik* (pockmarked) and dull (less attractive to buyers), so they are not competing with citrus fruits from outside Bali. This condition is also caused because fruit production is seasonal, where during the harvest, abundant fruit with small fruit sizes is less uniform so prices are very low. This causes many farmers in the harvest season to leave their fruits unharvested (rotten on the tree) due to low selling prices (1,000 - 1,500 per kg). In addition, the shedding of young and mature fruits before high harvest causes production to decline, reducing the income of citrus growers [5].

The issue of citrus agribusiness strategies in Belantih Village since the last decade has been declining. This is due to the low capacity of farmers' human resources in responding to the development of good and correct cultivation technology (GAP) as well as in the context of good post-harvest handling of oranges

following the principles of Good Handling Practices (GHP) so that the oranges have a longer shelf life and have added value in sales [3].

The results of observations in the field found that the low production of Siamese citrus fruits, in addition to being caused by seasonality, is also caused by the large number of flowers and fruits falling off before developing and the fall of fruits before harvesting and the quality of the fruit is low (it looks that the dull skin of the fruit is not shiny) as shown in Figure 1. The low production and quality of fruits is caused by farmers allowing their crops to bear fruit densely without being accompanied by the application of good and correct cultivation methods, namely not fertilizing in a balanced manner, pruning unproductive branches and branches that are attacked by diseases, so that there is competition between fruits for nutrients and assimilates so that the fruits formed are small and many fall before developing. Control of plant-disturbing organisms is also not carried out intensively so many fruits fall before being harvested due to fruit fly attacks.

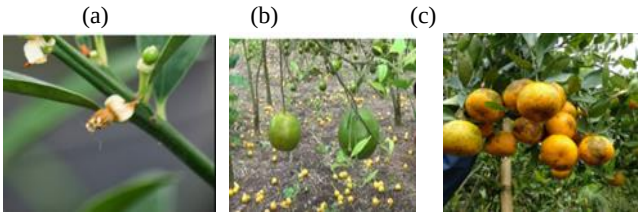


**Figure 1.** (a) Flowers and fruits wither before they develop, (b) Fruit fall before harvest, and (c) Low fruit quality due to dull fruit fly attacks

To overcome these issues, action research is conducted by educating and assisting farmers in preventing flower and fruit loss before development, preventing fruit loss before ripening, and enhancing fruit quality.

### *1.2. Literature Review*

Some of the causes of flower & fruit loss are 1) Lack of nutrients, especially macro and micro elements, 2) Unfavorable weather (continuous rain during flowering, 3) The garden is too humid, and 4) The occurrence of pest & disease attacks, before the fruit can be harvested. Efforts to prevent Siamese flowers and citrus fruits from falling off quickly are through fertilization technology, pruning & pest control, both organically (using vegetable pesticides) and pesticides [5] and [6].

Ref. [1] states that fertilization can be done using organic or organic fertilizers containing elements N, P, and K, Ca, Mg, and microelements (Cu and Zn) because these three elements (NPK) are needed by plants in their growth & development. Element N supports the vegetative growth of plants. Element P stimulates root growth and flowering. Element K plays a role in strengthening plant tissues. The element Ca serves to strengthen plants so that they are not easily infected with fungi or bacteria; the shelf life of the fruit is more prolonged (the effect of thicker cell walls), reduces flowers and deciduous fruits, and prevents fruits from breaking on the tree. Mg functions in the formation of chlorophyll so that photosynthesis increases plant resistance/immunity to pests and diseases, sugar formation (sweeter fruit), carbohydrates, fats, and proteins, and increases plant productivity because Mg fertilizer can prevent the fall of flowers and fruit.

Ref. [2] and [4] found that pruning treatment of citrus plants and the application of Agrodyke fertilizer are very important because Agrodyke fertilizer contains macro and micronutrients that can increase the quantity and quality of the fruit (the shape and sweetness of the fruit), extend the shelf life of the fruit and reduce damage during storage.

Based on the results of the study mentioned above in line with the results of previous researchers' studies, namely [7], [8], and [9], which stated that citrus plants could produce well if fertilized with organic fertilizers and fertilizers containing N, P, K and Ca nutrients with the right dosage and application time.

### *1.3. Research Objective*

This study aimed to determine the efficacy of a practice-based learning strategy to prevent Siamese flowers and citrus fruits from falling off easily, specifically through fertilization technology, pruning, and the organic (using vegetable pesticides) and organic control of plant-disturbing organisms.

## 2. METHODS

The implementation of activities employs a practice-based learning strategy. Counseling and mentoring, as well as the transfer of technology, are used to carry out the activities. The technology to prevent the loss of Siamese flowers and citrus fruits will be applied in the dedication of the Regional Leading Product Development Program, which is the result of research [2] involving the application of NPK Guano organic fertilizer at a dose of 500 g + 40 g of Agrodyke/tree fertilizer by soaking it in the soil. To prevent flower and fruit drop and enhance fruit quality, Agrodyke fertilizer is also sprayed onto the plant's leaves at a rate of 40 g/l to prevent flower and fruit drop and improve fruit quality. Moreover, according to research, vegetable pesticides containing neem leaf extract can be sprayed throughout the plant to avoid fruit fly attacks [3]. Up to twenty-five Dharma Kriya farmer group members participated in the counseling and mentoring programs. Counseling to educate participants is conducted through a comprehensive explanation of the material and steps for implementing activities, accompanied by interactive discussions and dialogues, so participants can comprehend and embrace the technological innovations to be applied.

Demplots receive assistance to facilitate technology transfer to administrators and members of agricultural groups of interest. Through the distribution of questionnaires, the success of the implementation of counseling and mentoring is evaluated, and the tabulated results are used to enhance subsequent services.

## 3. RESULT AND DISCUSSION

Practice-based learning strategy. on preventing the loss of flowers and Siamese citrus fruits have been successfully carried out through counseling and assistance to the target farmer groups. The counseling went smoothly and was followed very enthusiastically by the participants as evidenced by their various questions, responses and seriousness in listening and paying attention to the material presented through the provision of leaflets and the submission of fertilizer donations to farmer groups. Counseling on technology to prevent organic loss of flowers and fruits and the submission of organic fertilizer donations to farmer groups are presented in Figure 2.

In the plot demonstration activity through the learning-by-doing method, participants were enthusiastic and actively involved in practicing the technology transferred by the service team, such as pruning unproductive water branches, shoots, and branches to stimulate the formation of flowers. Giving examples of pruning water branches, unproductive shoots, attacks by diseases to stimulate flowering, and making fertilizer holes for applying NPK Guano organic fertilizer are presented in Figure 3. To reduce the competition for nutrients we provide for staple crops, garden cleaning is carried out, run around the root to apply NPK Guano fertilizer and agrodyke fertilizer by spraying all over the plant, as presented in Figure 4.

To determine the success of the implementation of counseling and demonstration of the plot, an evaluation was carried out through the distribution of questionnaires. The results of the questionnaire tabulation filled out by 25 participants showed that 92.00% of respondents expressed satisfaction and 8.00% expressed satisfaction with the PPPUD service activities, meaning that none of the respondents expressed dissatisfaction or dissatisfaction. It is very encouraging that 96.00% of respondents stated that they were very interested and the remaining 4.00% stated that they were interested in practicing in their own gardens. This means 100% of participants want to implement it in their gardens. The satisfaction level of Counseling Participants on Organic Siamese Flower and Citrus Fruit Loss Prevention Technology is presented in Table 1).

**Figure 2**. Counseling on technology to prevent organic flower and fruit loss and the handover of organic fertilizer donations to farmer groups

**Figure 3.** Providing examples of pruning of water branches, unproductive shoots, and disease attacks to stimulate flowering (top). Making fertilizer holes for the application of NPK Guano organic fertilizer (bottom)

**Figure 4.** An example of applying Agrodyke fertilizer through the leaves by spraying throughout the plant

**Table 1**. Satisfaction Level of Counseling Participants on Technology to Prevent Organic Loss of Siamese Flowers and Citrus Fruits

| No. | Question | Level of Satisfaction (%) | | | |
|---|---|---|---|---|---|
| | | Very satisfied | satisfied | Less satisfied | Very dissatisfied |
| 1. | Are you satisfied with the implementation of this extension activity? | 92.00 | 8.00 | 0 | 0 |
| 2. | What do you think about the counseling material? | 92.00 | 8.00 | 0 | 0 |
| 3 | How do you respond to the method of counseling provided? | 84.00 | 16.00 | 0 | 0 |
| 4 | About this counseling activity, are you satisfied with participating in it? | 88.00 | 12.00 | 0 | 0 |
| | | Very Interested | Interested | Less interested | Very disinterested |
| 5. | Do you want to apply / practice the application of off-season fertilization technology and improve the quality of Siamese citrus fruits in your own garden | 96.00 | 4.00 | 0 | 0 |

## 4. CONCLUSION

During the service activity, the participants were enthusiastic about following, as evidenced by their seriousness in asking questions and discussing. The method used is learning by doing, so they state that they can easily understand the technology given. Based on the tabulation results from the questionnaire provided, it was found that 92.00% of the 25 respondents expressed great satisfaction, and 8.00% were satisfied with the PPPUD service activities carried out, which means that none of the respondents expressed dissatisfaction or dissatisfied. 96.00% of respondents expressed great interest in practicing flower and fruit loss prevention technology in their gardens, and the remaining 4.00% stated they were interested. 100% of participants are interested in applying it in their garden.

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