



## ENHANCEMENT OF PASSION FRUIT YIELD THROUGH IMPROVED CULTIVATION TECHNIQUES IN DISTRICT KELARA REGENCY OF JENEPONTO

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### ABSTRACT

Opportunities for passion fruit business are still wide open due to expansion of growing areas in the lowlands and opportunities for export market. However, one factor that limiting the development of this commodity is poor cultivation technique applied at the farmer level result in low production and fruit quality that does not meet market requirement. This community service program aimed at increasing the production of passion fruit through improved cultivation techniques. The benefit obtained is to increase the knowledge and skills of farmers in improved techniques of cultivation of passion fruit. The methods used in these activities are workshops and participatory learning in the form of counseling, mentoring, and demonstration plots. Partners for the activity are Kampung Berua farmer group and Mataere farmer group in District Kelara, Regency Jeneponto Province of South Sulawesi. Counseling material given is related to passion fruit cultivation techniques and standard operating procedures. The assistance is conducted in the form of selection process of fruit and seeds that will be used as seed, plant propagation from seed and stem cuttings, and plant maintenance techniques. In the implementation of these activities, the farmers' groups participated actively so that the expected knowledge and skills of farmers groups increased and will ultimately result in increased production of passion fruit.

**Keywords :** *Passion Fruit, Cultivation techniques, Production*



## I. INTRODUCTION

Passion fruit is one of the major horticultural commodities with great potential to be commercially cultivated. Passion fruit production centers in Indonesia are still limited, namely South Sulawesi, North Sumatra and West Java. Types of passion fruit that generally cultivated are purple or siuh passion fruit (*Passiflora edulis f. edulis* Sims), yellow passion fruit (*Passiflora edulis f. flavicarpa* Degner), 'konyal passion fruit (*Passiflora lingularis*), and vegetables passion fruit or erbis (*Passiflora quadrangularis*). However, among the four types mentioned above, only two types are widely grown commercially, namely purple and yellow passion fruit.

Passion fruit has been a leading commodity and pride of the people of South Sulawesi. Passion fruit is popular fruit because of the freshness of flavor and benefits. Passion fruit can be consumed directly and processed into syrup or soft drink. Passion fruit is a fibrous food good for health as it can aid digestion. Additionally, passion fruit can also function as antioxidants (such as vitamins) that are useful for preventing and combating various diseases as well as increase the body immune (Rukmana, 2007).

Opportunities for the passion fruit commodity business are still widely open due to expansion of growing areas in the lowlands and marketing opportunities for export. However, one factor that is limiting the development of this fruit is lack of information received by farmers and the poor application of farming technologies. Obviously that this affect the production and quality of the fruit produced that could not meet the market requirement. In South Sulawesi Province passion fruit widely grown in the upland areas such as Gowa, Tana Toraja, Sinjai, and Enrekang. Passion fruit is known as a plant that only grows in the highlands (700-1000 m asl), but it turns, this plant can also grow and produce in the lowland. Type of passion fruit that grows in lowland called lowland passion. Regions in South Sulawesi that grown this type are Jeneponto Maros, and Bantaeng

Jeneponto regency has a great opportunity for the development of passion fruit. Cultivation of the fruit in South Sulawesi, to date, is focused in the highland areas such as Gowa Regency (Malino) and North Toraja Regency. However recently, there is decline in production due to pests and diseases. As a result, a number of farmers cultivating passion fruit then switch to high-value vegetable crops. Fact that Jeneponto is located within a reasonable distance from Makassar ensures greater future opportunities because the fruit are close to the location of the fruit processing industry in the city of Makassar. In addition, compared to the hilly and poor condition of the road to the North Toraja Regency, road condition to Jeneponto relatively flat with good road conditions.

Passion fruit cultivation is conducted to meet the local market and the export market. The passion fruit can be marketed as fresh fruit or processed fruit (passion fruit juice). Passion fruit juice itself is one of the souvenirs of Makassar and most often purchased by tourists. In Makassar there is some passion fruit processing industry with a variety of passion fruit juice brand and a quite diverse price. Supply chain of raw materials of the industry is in collaboration with farmer groups from passion fruit producing areas. However, the supply chain of the raw materials for passion fruit industry often encountered obstacles. This is because of the passion fruit is a seasonal fruit which has surplus supply when harvested at peak season and vice versa. According to Razak and Karundeng (2009), passion fruit has two peaks of harvest season, the first in the month of July to August and the second in the month of December to February. Between these two periods, there is the production with small value. Price also depends on the season of passion fruit. During harvest time, prices fall below IDR. 3,000 per kg, but in the off-season the price can



go up to IDR. 15,000 per kg. Therefore, to overcome the difficulties of the raw material production area should be improved to ensure availability of the fruit throughout the season. This community service program aimed at increasing the production of passion fruit through improved cultivation techniques. The benefit obtained is to increase the knowledge and skills of farmers in improving the cultivation method.

## II. METHOD OF ACTIVITIES

### Method of Activity

The recent community service activities are a part of the Science and Technology for the community (IbM) activity entitled "IbM Development of Cultivation and Postharvest Technology for Passion Fruit Farmers Group in Jeneponto". Partner for the activities are farmer groups of Kampung Berua centered in East Tolo village and farmer groups of Mataere located in Tolo village, both are in District Kelara, Jeneponto regency, South Sulawesi Province. The number of farmers who participate in the event was 20 farmers for each farmer group.

### Implementation of Activities

The activity was carried out using workshops and participatory learning methods (participative learning) with the following steps.

1. Extension to the farmer with material given, Passion fruit cultivation techniques and standard operating procedures.
2. Assistance in the form of a selection of fruit and seed to be used as seed, plant propagation from seed and stem cuttings, and plant maintenance techniques.
3. Set up of a demonstration plot for pilot project.

## III. RESULT AND DISCUSSION

Jeneponto is a regency located in the southern part of South Sulawesi province with geographical position between 5°16'13" - 5°23'12" South Latitude and 119°29'12" - 119°56'44.9" East Longitude. Total area of 74 979 ha Jeneponto consists of 11 districts, the District Bangkala, District West Bangkala, District Tamalatea, District Bontoramba, District Binamu, District Turatea, District Batang, District Arungkeke, District Tarawang, District Kelara, and the District of Rumbia (BPS 2012). Topographically, the northern part cover up a highland with an altitude range of 500-1400 meters above sea level, the central part with a altitude of 100-500 meters above sea level and the southern part of the region is coastal lowlands with an altitude of 0-150 meters above sea level.

The community service activities are located in the District Kelara which has a distance of 13 km from the district capital and 90 km from the provincial capital (Makassar). Kelara district covers an area of approximately 102.25 km<sup>2</sup> with a diverse topography, about 9 wards / villages having a height <500 masl and 13 sub district / villages have an altitude of 500-1000 meters above sea level. Kampung Berua farmer groups are located in the village of East Tolo which adjacent to the District of Rumbia, while Mataere farmer groups is located in the village of Tolo in the district capital.

Farmer groups of Kampung Berua and Mataere has been extensively producing passion in the last three years that mainly intended for the export market. Since 2013, cooperation between the Kalla Foundation with Department of Agriculture and Horticulture of South Sulawesi hold fresh passion fruit exports to Singapore. However, marketing process sometimes encounter



several obstacles. The quality of passion fruit produced have not been able to meet export quality due to cultivation techniques that are not optimal. As a result, many farmers reluctant to continue due to disappointment as their fruit fail to be selected for export.

Activities undertaken in this community service are as follows.

#### 1. Extension

The extension activities were performed twice on the two farmer groups namely Kampung Berua farmer group and Mataere farmer group. The material on this extension activities include: 1) steps in the plant culture system, 2) fertilization in the off-season, 3) harvest and post-harvest management, and 4) the standard operating procedures of the passion fruit. Improvement in cultivation techniques was carried out in accordance with the steps in the culture system, namely: 1) land preparation, 2) preparation of the planting hole, 3) preparation of the seed / seedling consist of determination of the parent tree as a source of seed, fruit selection for seed, selection of seed candidates, and seed nursery, 4) planting, 5) the setting of vine climbing, 6) plant trimming, 7) fertilization, 8) weeding, water supply management, and 9) control of pest and plant disease.

Passion fruit should be available at all times, especially to meet the needs of fresh fruit to be exported abroad. To meet the needs, off-season fertilization efforts should be done. Fruiting vines can be stimulated by a number of interventions, among others, 1) the use of growth regulators paclobutrazol eg, CCC, and CEPA, 2) regulation of the water supply in order to stimulate fertilization, and 3) the application of organic matter after harvest that can stimulate out of season fertilization.

#### 2. Assistance

The assistance to the farmer was carried out by giving example and practices related to selection of fruit and seed to be used as seed, plant propagation from seed and stem cuttings, and plant maintenance techniques. Based on the observations, there are 13 types of passion fruit cultivated in this region. The type of passion fruit that generally cultivated in the regency of Jeneponto is *Passiflora edulis*. This type is the kind of passion fruit that is genetically stable and has not yet been updated. Generally, this type produces small fruits with taste little sour, and sensitive to disease. In addition, fruits and seeds used as propagation materials did not pass a selection stage therefore often the seeds are not eligible. Criteria for mother plant determinate as a source of seed are have been producing fruit for at least 5 times, strong growth, main stem is dominant, high production, and healthy plants (not attacked by pests and diseases). Fruit selected for seed must meet some criteria such as the fruit comes from the mother plant that meets the requirements, maximum size of the fruit, full purple color and shiny, and full ripe and healthy fruit.

Cultivation of passion fruit in the District Kelara originally carried out by farmer buying seedlings from outside Jeneponto region. Farmers who are already doing their own propagation carried out seed propagation. Aside from seeds, passion fruit plants can also be propagated by stem cuttings. According Pitojo et al. (2010), the advantages of propagation by stem cuttings are: 1) Passion fruit plant propagating material can be provided in relatively higher amounts in a relatively shorter time, and no seasonal limit, 2) passion fruit seedlings have same properties as its parent, and 3) plants from stem and branches cuttings relatively produce fruits earlier.

Assistance given related to plant maintenance techniques include watering, weeding, tilling, setting of frame for vine climbing, pruning, and fertilization. So far, a proper pruning technique has been carried out by the farmers. Plants were allowed to grow densely make a excessive leaf cover the climbing frame. This result in low fruit production and plant only last



for 2 years. Absence of pruning due to farmers feels affection towards plants. However, plants are not able to provide maximum results if trimming activities is neglected. The parts of plants that need to be trimmed are 1) part of the plant that grow abnormally, such as yellow leaves or parts that are stunted, 2) overlay and piled up stems, the branches that grow too dense have to be trimmed on the inside because the passion fruit is unlikely to bear fruit on the inner branches or on the part that been crushed, and 3) water shoots or non productive vines because it will spend on food (Umam, 2012).

Pruning vines is conducted to stimulate the growth of shoots and to design the branches to obtain the favorable shape of the plant and plants can productively bear fruits (Rukmana, 2007). Pruning vines follow the pattern of 1-3-9-27 with the understanding that there is 1 main stem, 3 primary branches, 9 secondary branches and 27 tertiary branches. Sgape pruning activities carried out to obtain the main stem with strong branching. Pruning is done at the beginning of the rainy season when the new growth is visible (buds initiated on new shoots). Furthermore, pruning is also conducted post harvest after fruit picking to dispose dead branches and dry leaves. In addition, cutting on a long branch needs to be done, especially to stimulate the release of more fruit branches (BPTP Sulawesi, 2014).

Another problem faced by passion fruit farmers is the Fusarium wilt. The disease is caused by the fungus *Fusarium oxysporum* Schlecht var. *passiflora* Gordon (Pitojo et al., 2010). Fusarium wilt usually occurs due to problems in water availability. As it is known that Jeneponto have limited rainfall and irrigation infrastructure. According to Karsinah et al. (2010), Fusarium wilt disease control can be performed by using antagonistic fungi *Trichoderma koningii* and *Gliocladium* spp. applied prior to planting. Further application is on the surface of the soil around the stem and then covered again with soil. Application is given twice a month at a dose of 200-250 g / plant. Field and drainage sanitation must be undertaken regularly because of rapid growth of Fusarium wilt in wet soil with poor drainage. In addition, in case of the disease outbreak, dead plants should be removed and destroyed and the land must first left for 1-2 years before planted.

### 3. Setting of Demonstration Plot

The activity on setting of demonstration plot carried out on farmers' land with an area of  $10 \times 10 \text{ m}^2$  and a spacing of  $2 \times 5 \text{ m}^2$ . The materials used were passion fruit plant seeds, manure and NPK fertilizer. The tools used were poly bag size 20 x 30, bamboo, wire rolls, hoes, buckets, water dipper, and scissor. Manure was applied in the planting hole of 1-2 kg / hole. Subsequent fertilization is done every four months so that in a year there are three times fertilization performed. Fertilizer application is done by initially made small array 15 cm deep around the stem of the plant passion fruit; fertilizer is spread evenly into the array and covered with soil about 10 cm; then watering with clean water until the soil is quite wet to ensure a soluble fertilizer that can be utilized by the crops (Rukmana, 2010). Fertilization can be done simultaneously with weeding and tilling the soil around the plant.



#### IV. CONCLUSIONS AND RECOMMENDATIONS

From community service activities it can be concluded and suggested as follows.

1. The proper cultivation techniques can improve the production and quality of passion fruit.
2. Both the farmer groups had actively participated in the activities undertaken.
3. The mentoring activities should be continued so that the knowledge and skills of farmers' groups can be further increased and will ultimately result in increased production of passion fruit.

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