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### Innovation Technology of Grafting Seed on Passion Fruit (*Passiflora edulis*). Create Longer Life of Plant In Gowa District, South Sulawesi Province, Indonesia

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#### KEYWORDS

Grafting passion fruit seed, increasing production and longer life of passion fruit plant.

#### ABSTRACT

The aim of study is to introduced technology of applied grafting seed on Passionfruit, in order to create a longer life of plant., will give a higher amount of production compared with plants developed from seeds of purple passion fruit (*passiflora edulis*). This technological innovation is an activity to see the real effect of seed connection with the variables age, longer life, crop production is higher than single plants from seed (seedling). Innovation technology study was conducted in July to December 2014 in Silanggaya Village, Tombolo Pao Sub District, Gowa District. South Sulawesi. It was applied randomised parallel-group study. The unique of this passionfruit (*Passiflora edulis*) which is became icons of South Sulawesi, it has the advantage with a more distinctive taste (sour-sweet) had high levels of vitamin A and C and have high deman for export. Passionfruit (*Passiflora .edulis*) is known to be sensitive to local passionfruit nematodes and resulted in only reaching age of 1 to 2 years old, therefor it needs to be made by using a seed grafting rootstock resistant to nematodes while using scion *passiflora edulis* that tastes unique by means of grafting. Various activities have been carried out include: survey and identification of candidate varieties of *passiflora edulis* parent tree to be used as source of scion and rootstock which is connected with the yellow passion fruit or passion fruit called Konyal (*Passiflora ligularis Juss*). Based on the results of separate studies have found through identification based on morphology and molecular marker applications, it has acquired the kinds of varieties with superior potential as a high-quality production and has high juice content are potential to be used as rootstock (understem) with a strong rooting system. It is expected that the next stage will be made observations *Passiflora edulis* entres farm that is almost extinct and rootstock of various improved varieties, rootstock and seeds as the result of this connection, and in the end will be proposed for the release of varieties, so the acceleration of the expansion activity of passion fruit planting area in South Sulawesi can be accomplished. The results of a separate study has found 13 different accessions originating from two different places in South Sulawesi, such as Gowa District and Tana Toraja District. Differences based on morphology can be seen from the leaves, flowers and fruit. Even this exploration results identified the presence or konyal accession sweet passion fruit (*P. ligularis Juss*) which has potential as a rootstock. The passionfruit has a wide adaptability, because as the result of the observations that can be grown in both lowland and upland. Differences based on molecular markers (Competitive Grants scheme) using specific primers ISSR, to 13 accessions, can form two main groups namely the purple passion fruit plant "purple passion fruit (*P. edulis f. Edulis Sims*) and the yellow passion fruit plants" yellow passion fruit (*P. flavicarpa Deg.*) as group I and sweet passion fruit plants or konyal (*P. ligularis Juss*) as group II. Group I formed two sub-groups that distinguish between purple passion fruit with yellow passion fruit. Base the results of this innovation activities in the hamlet of farmers Passionfruit at Silanggaya Village, Tombolo Pao Sub District, Gowa District has begun to adopt splicing technology seeds as they begin to believe in will be able to extend the plant life and the passion fruit will give a higher amount of production compared with plants developed from seeds of purple passion fruit (*passiflora edulis*). It is characterized by enthusiastic farmers to grow passion fruit rootstock Konyal (*P.linguaris*) and seedling them as rootstock while Purple Passion (*P. edulis*) is well maintained for entris source for scion.

## Introduction

Analisis situation- Gowa has an area of 1883.32 sq km and a population of as much as  $\pm$  500,000. Potential Gowa district is agricultural sector contributed 45 percent or Rp. 515.2 billion. Paddy fields were less than 20 percent (3,640 hectares) of the total land area of the district, It is able to provide sufficient results.

Potential Gowa is the agricultural sector with the main job of farming population, per capita income gained Rp. 2.09 million (2010). Agricultural land is dominated by food crops sub-sector as the mainstay. The agricultural sector contributed 45 percent or Rp. 515.2 billion. Paddy land less than 20 percent (3,640 hectares) of the total land area of the district and is able to provide sufficient results. Among agricultural commodities in the highlands of Gowa, is the passion fruit plants (*Fassifora* sp).

One of vines (*Fassifora* sp) are very specific is the purple passion fruit (*Passiflora edulis*) and classified as a fruit which is branded fruit endogenous South Sulawesi Province. Purple passion fruit (*Passiflora edulis*) is a preferred type because it tastes sweet cowardice. Each visitor who come to Makassar, the passion fruit juice is a souvenir that they will not forget and more on display in the Sultan Hasanuddin Airport, souvenir shops and stalls around the airport. If we look at the views of the airport or the port, most of the passengers who will leave Makassar bring flavorful juice fruit.

Plants from original o South American mainland is identical to that of South Sulawesi. Kanreapia Village, Tombolo Pao District is one of passion fruit producing areas in Gowa. Unfortunately, passion fruit flavored fruit is sweet - sour and capable of moving the food and beverage industry is

small, less desirable now beginning farmers. Planting of passion is

## Passion fruit plant

Not easy, as long cropping period and require special care, such as planting locations are in the 800-1400 asl, also requires fertilizers and pesticide are quite expensive.

Passion fruit plant, originated in South America and Latin America are tropical. Currently there are more than 400 species, of which approximately 50 species of fruit can be consumed as table fruit.

Passion fruit plants are usually grown from seed. To obtain good seed from fruit, needed ripe fruit on tree with the characteristics of the fruit skin color magenta or approximately 75% purple (kind of *Passiflora edulissims*), yellowish or approximately 60% yellow for type P. Flavicarva. The fruit are picked directly from the tree and then stored for one or two weeks until perfectly ripe fruits before the seeds are released. When the seeds sown immediately, it will germinate for 2-3 weeks.

In general, passion fruit farmers in the village of Silanggaya, Tombolo Pao districts, Gowa regency, South Sulawesi province using passion fruit seedlings from seed.

Passion fruit seedlings from seed has the following disadvantages:

- a. Generally short plant age (1-2 years), due to root rot,
- b. From planting to fruiting takes approximately 9-12 months,
- c. Easily attacked by pests and disease specially the type of nematode, and

- d. Has the harvest season (peak season) per year. This certainly raises problems in passion fruit productivity. In addition to seeds, passion fruit can also be propagated by grafting (dial), or cuttings. Parts of plants that will be good cuttings taken from a good parents plants are quite old and woody, has 3-4 segments. Seedlings from rooted cuttings ready to be planted at the age of 90 days.

Grafting plays an important role especially in conserving species, hybrids and reduce damage due to attack nematodes and disease using the type of passion fruit rootstock *flavicarva P.* and *P. linguaris*. Buds (entries) used *Passiflora edulis* and is taken from a healthy branch, preferably from a plant that has been fruitful.

In this activity has been identified approximately 30 parent trees that are worthy of being the source of scion. Diameter entries adapted to the lower stem diameter. How can these connections with the connection or the connection side slit. Planting with seedlings connection (grafting) could be a new alternative for passion fruit farmers in South Sulawesi province.

Passion fruit seedlings connection technology adoption is expected to increase the production of passion fruit. Similarly, cost reduction and labor in rehabilitating crop every three to four years, compared with the use of labor to plant new seeds each year with input and means main key (propagation) are made.

With the technology of grafting seedlings (grafting) can overcome labor costs , so the selling price or the value-added of this commodity can be improved, with

increasing age of the plants longer (2-3 years or more) in accordance with the guidelines of passion fruit cultivation (understanding The Passion fruit Plants), The Australian Horticulture Department.

Under the conditions of community issues passion fruit farmers in the village of Silanggaya the introduction of technology has been made in the improvement of plant seeds in order to plant age can last a minimum of 3-4 years and remain productive gave fruit is optimal. Meanwhile, to cope with the price of passion fruit which is very cheap (not profitable for farmers) is analyzing the marketing chain passion fruit from farm producers to factories passion fruit processing passion fruit into juice and generally mill passion fruit located in Makassar (Malino 75 km), distance to the center of Makassar as a center of marketing the beverage industry. In this activity has been monitored and market chains still very Simple and only sell products to one of the residents as collectors and bring it to market Malino to be marketed to consumers in general, is the end of the town of Malino as local tourists.

### **Materials and Methods**

To establish study groups farmer participatory and each of study group sand two members to study group in the village of Silanggaya, to follow demonstration of garfting seed at Tombolo Pao Sub Distric, Gowa Regency, which this location is one of the largest Passion fruit planted.

Second, it hold a workshop (discussion section) on how to do grafting seed and explain why grafting seed should be done.

Third is to explain the benefit of grafting seed in term of gain farmer income, After it is adopted the technology of grafting

seedlings (grafting seed), then the farmer participants practising to do grafting and the last, farmer back to their farm to plant some seed for rootstock before they can practise-do grafting technology at respective locations.

The first stage of the implementation is done seeding, aged 9 weeks of grafting, 3 weeks later planting refreshment. At this stage has been given and rootstocks that are ready to connect later invalidated. At the age of 7-8 months is expected their first conception, three months faster than conventional planting.

Seedling rootstock yellow passion fruit (*Passiflora flavicarpa*) that grows to about 50 cm, then connected with the scion (scion) of *Passiflora edulis* (purple), as scions (scion). Use of scion should be taken from the mother plant flowering *Passiflora edulis* are temporary and have been fruitful.

At the location of activities have been identified and labeled fatherly parent trees worth taking entries. The fruit of passion fruit connection will be greater than the passion fruits from the seeds (seedling) without a connection or grafting.

The advantages of yellow passion fruit (*Passiflora flavicarpa*) as rootstock below is resistant to fusarium; withered, and tolerant of pytophthora, nematode and brown spot. At the age of 7-8 months is expected their first conception, These plant fruiting three months faster than conventional planting is by using seeds (seedlings) the average age of 12-14 months

### **Problems**

Population of passion fruit declined was replacing with vegetable crops In addition to farming vegetables that have a short

growing season, farmers in Gowa also farming year crops. One of them is the passion fruit plants (*Fassifora* sp).

Unfortunately, passion fruit sour taste of the fruit is sweet and capable of moving a small food and beverage industry is now beginning farmers less desirable. Planting of passion is not easy. Except for long cropping period, passion fruit require special care, such as high surface soil, fertilizers, and pesticide, fungicide are quite expensive. In addition, the price of passion fruit is also unstable and likely to continue to decline. Commodity passion fruit has been replaced by vegetable crops (potatoes, carrots and onions Peray), where the distribution of vegetables gives results that are shorter (three months), also gave prices a more promising.

The problems are more specific to the commodity passion fruit are:

- a. The use of seeds from seed (seedling) has weaknesses that cause problems in passion fruit productivity and productive lifespan is short, sometimes only 1-2 years old so that the necessary rehabilitation (re-planting) every two years.
- b. Farmers have not done the correct cultivation or GAP (Good Agriculture Practices), using the techniques of seed connections (grafting).

### **Results and Discussion**

1. Target Implementation of the studiea are:

- a. To establish a study groups passion fruit named Silanggaya Study Group.

b. Implementation workshop grafting seedling cultivation of passion fruit and passion fruit with rootstock (*Passiflora Passiflora linguaris* and flavicarpa) connected with the scion *Passiflora edulis*.

c. Introducing parent tree selection as a source scion

b. It had planted number of grafting seed on field

d. identify the parent tree to show the criteria that must be considered, such as passion fruit that will be the parent tree has been outstanding for more than one year and have been fruitful at least two times, free of pests / diseases. The results of the identification of these trees have been labeled to be known as the scion source that will be used at the time of grafting,

e. farmers participants have been given the opportunity to graft by themselves.

f. Study groups farmer has planted the seeds of passion fruit by using simple lay out. Participants were then assigned to plant rootstock.

### **Solutions Offered**

Passion fruit farmers should use on Grafting Seed

In general, farmers in Gowa district use passionfruit seeds from seed. Some of the drawbacks of using seeds from seed planting is generally shorter lifespan, small fruit, and production is low.

Based on the condition of farmers in Silanggaya hamlet, village, Tombolo Pao district, Gowaregency then has been introduced grafting seedling using flavicava

and *Passiflora linguaris* as rootstock and to the top rod (enteris) of *Pasiflora edulis*.

d. Seeding candidate rootstock (understem) passion fruit of some varieties of passion fruit (Passifloralinguaris, Passifloraflavicarpa).

e. Identifying the problems of declining population passion fruit plantation.

### **Outcomes Produced**

a. Adopted passion fruit seedling grafting technology to farmer through learning groups Silanggaya Passion. The material presented is of interest Innovation technology to be applied in the improvement of cropping systems by using the passion fruit seedlings connection.

b. Understood how to prepare root stock and how to select the single plants are going to be used as source scion from mother tree. This is in response to the short age of purple passion fruit (*Passiflora edulis*).

c. Understood how to identify the parent tree to show the criteria that must be considered, such as passion fruit that will be the parent tree has been outstanding for more than one year and have been fruitful at least 2 times, free of pests / diseases. The results of the identification of these trees have to be known as the scion source that will be used at the time of grafting.

d. Farmer participants have been given the opportunity to practice to do the grafting.

e. Every farmer has planted 15 trees and broadcast amount of seed for rootstocks.

f. then the farmers of the study groups are directed to plant accordance with the lay-out which have been shown in the field

### Solutions Offered

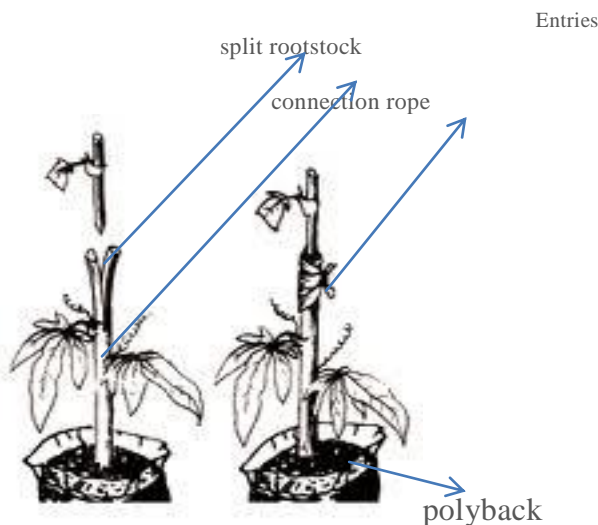
Passion fruit farmers should use grafting seed.

In general, farmers in Gowa Regency use passion fruit seeds from seed, therefore it found short life span, small fruit, and production is low.

**Figure.1** Passion fruit plant



**Figure.2** Passion fruit seed grafting technique. a. Entries under Division b. Connection Bond + media as seen from the image above is the technique of grafting seedling passion fruit, as the opinion of Mark Traynor (2008), that: a. The connection is carried out under the auspices of spoil to avoid the results of connections; b. Cut the lower stalk with a sharp knife (scalpel); c. Remove the lower stem leaves all along that will be divided; d. the parties, trunk down 25-40 mm;



Based on the condition of farmers in Silanggaya hamlet, Tombolo Pao Sub District. districts, Gowa Regency then has been introduced grafting seedling seeds using flavicava and *Passiflora linguaris* as

rootstock and to the top rod (enteris) of *Pasiflora edulis*.

Grafting techniques are already tested in the United States of Hawaii, Darwin Australia

and Latin America in Brazil by Mark Traynor (2008), where the benefits of grafting seed are: a. It is resistant to wilt disease, b. Resistant to root and disease caused by a nematodeb. Fruiting earlier than usual (seeds of seedlings).

To further streamline the system then introduced the cultivation of passion fruit seedlings connection technology (grafting) in the group and is expected petanaman Silanggaya passion fruit can be early fruiting and can last longer until the 3-year and give fruit larger and higher production.

Adannya continuation training is required to learn more -group group in the village of executing and expected for the continuation of study. In all three will appear more clearly (significantly) the character and performance of single plants than planting native seedlings connection of the seed.

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