

Local Wisdom on Garlic Cultivation in Sembalun Highland of Lombok Island - Indonesia

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Abstract. Sembalun Highland in Lombok Island is well known as garlic production area in Indonesia which produced 45% of Indonesian garlic since 1980s until recently. In 1980s, garlic productivity reached 35-40 tons/hectare. Currently, with the full of chemical (fertilizers and pesticides) inputs, productivity ranged between 15 to 20 tons/hectare. This paper aims to investigate the local wisdom of Sembalun community in cultivating garlic during that golden era which leads to obtaining high yields from the beginning of garlic cultivation until the 1990s. The paper was prepared through a study conducted in Sembalun Highland from January to July 2018. Data and information were collected through in-depth interviews with several community leaders as historical actors. The results indicated that the successful garlic cultivation from the very early period in Sembalun Highland due to application of some local wisdom such as: 1) special selection and treatment of garlic seeds before planting; 2) excellent tillage application; 3) proper sowing time; and 4) special postharvest handling. By investigating these local wisdom, it is hope that there were some lesson learn gained in order to improve current farming practices.

1. Introduction

Garlic (*Allium sativum* L.) is a very important horticultural product for Indonesian people because it is used as a cooking spice, medicine and cosmetic ingredients [1]. At least the current national need for garlic is around 500,000 tons per year [2]. The very large amount was met from imports of 480,000 or around 96% and the rest was met by domestic production of 20,000 tons or around 4%. Of the four percent, the West Nusa Tenggara (WNT) Province contributed the largest planting area to the national harvest area which reached 45% [3]. The high import of garlic began since the opening of the large-scale import in 1998 which caused local garlic to be unable to compete with imported garlic.

The huge dependence on imported garlic certainly must be of concern to all parties because it is very draining of foreign exchange. The main effort that must be done is to increase domestic garlic production. Since the 1980s until 1998, WNT Province is one of the main garlic producing areas in Indonesia with production centers located in the Sembalun area of East Lombok District. Achievement of productivity at that time was very high, reaching 35 to 40 tons of fresh garlic/ha, or when converted to dry garlic around 11.55 - 13.2 tons/ha. In 1987 Indonesian President Soeharto specifically came to harvest the garlic in the Sembalun area. When compared with the results achieved in other regions the results achieved by Sembalun farmers are certainly quite high. The highest potential for dried bulb in Karang Ploso (medium elevation) is Sanur variety, which is 8.1 tons/ha, and Gombloh variety is grown in the Banaran area (highland) which reaches 8.3 tons/Ha [1].

Currently the production of garlic in the Sembalun area is 4,765 tons of 363 ha of land managed, or it can be said that productivity is only around 13.12 tons/ha of fresh garlic which if converted to 4.3 tons/ha dry weight [2]. The deterioration in the production of garlic in the Sembalun region is certainly not without cause. Comparison of the results achieved between the 1980s and 1998 with the results achieved in the last few years is interesting to study.

For years, the Sembalun community applied the garlic cultivation techniques that they inherited and did for generations. Sembalun farmers learn independently how to practice good garlic cultivation techniques. Good habits born from generation to generation are local wisdom that deserves to be maintained. This paper aims to investigate the local wisdom of the Sembalun community in conducting garlic cultivation where they could obtain high yields from the 1980s to the 1990s.

2. Methods

This paper was prepared through a study conducted in Sembalun Sub-district, East Lombok District, West Nusa Tenggara Province of Indonesia from January to July 2018. This study used a qualitative design to be able to describe and explain situations and conditions in a clearer and more detailed manner. With a qualitative approach natural situations in the data source environment are maintained and problem analysis can be done accurately [4]. Data was obtained through in-depth interviews with several community leaders in the area. The key informants were chosen by several criteria, namely 1) historical actors; 2) people who are actively involved in the problem of garlic to be able to provide sufficiently detailed information clearly; 3) have enough time to provide the information needed; and 4) provide original information. Data collected from interview results were then analyzed and presented descriptively.

3. Results and Discussion

3.1. A brief history of Sembalun garlic

The Sembalun community began to develop garlic cultivation since the 1960s after it began in the 1800s under Dutch colonialism at that time, the community developed coffee plants in addition to red rice and cattle. The success of Sembalun coffee cultivation at that time caused many Chinese traders, who lived in the city of Ampenan, came and settled in Sembalun for months. Coffee commodities experienced a significant decline after 1959. Since then, the Sembalun community has begun to cultivate garlic. Garlic itself was originally planted as a limited commodity for the household needs of Chinese traders. Garlic seeds were brought by Chinese traders from the mainland of Central Asia and were known as Shanghai varieties. By local residents, the Shanghai variety is better known by the name of Sangga which until recently became known as the Sangga Sembalun variety.

At first, garlic was planted on forested land with shifting cultivation. The local community worked with the Ministry of Forestry at that time to reforest, with the agreement that the community plant and treat forest plants for reforestation, and they could use the land to grow garlic. In 1979 the collaboration ended, the community then switched to using land called the large rice field (*bangket beleq*). *Bangkit beleq* is the location of swamps which can only be planted by rice plants once a year (Figure 1). Beginnings in 1979 efforts were made to drain large rice fields so that they could be planted by plants other than rice.



Figure 1. Large rice field (*bangket beleq*) located in the Sembalun Highland of Lombok Island

3.2. Local wisdom of the Sembalun community

Local wisdom is a hereditary inheritance that can connect one generation to the next. Local wisdom contains social norms and values that regulate how humans should behave and act in fulfilling their needs with all available resources [5]. The local wisdom of the Sembalun community in garlic cultivation is reflected in some of the things they agreed to do by the community. The cultivation techniques that have been carried out by the Sembalun community are determining of planting time, seed treatment, tillage, and post-harvest handling.

3.2.1 Determination of planting time

At the beginning of June, village meetings are held to determine the start of the planting and scheduling season for one village. Planting is carried out according to the agreed schedule and carried out from generation to generation. Generally farmers adhere to that schedule because they have studied natural conditions for decades. If there are farmers who violate, sanctions will be imposed. June is believed by the community of Sembalun to be the best time to start planting garlic. Aside from being considered optimal results, it is believed that planting simultaneously at that time will reduce the possibility of the spread of garlic pests and diseases. This is consistent with what was conveyed that the most appropriate time to plant garlic is in the range from May to July [1]. For farmers who plant in class 1 paddy fields in the Sembalun area, June is the right time because the rainy season and wind are over so that the land can be planted with horticultural commodities including garlic. Rice fields cannot be planted with garlic during the rainy season because it will be submerged in water therefore farmers prefer to plant local rice which is up to 6 months old.

At present, the government is trying to boost local garlic production in Sembalun to restore national self-sufficiency in garlic. More than 500 Ha of land is planted with local garlic in Sembalun in 2017 and 2018. This condition makes farmers in Sembalun not fixated on the traditional rules (*awiq-awiq*) about the planting season because the rules are being abandoned. Farmers can grow garlic at any time, both in-season and off-season, which is during the rainy season. Poor air temperature and drainage

during off-season are the main causes of growth inhibition and decreased garlic yield [1]. No wonder the productivity during the off-season will decrease when compared to in-season.

3.2.2 Seed Selection

High quality seeds are the main determinant of the success of garlic cultivation. The success rate caused by the quality of seeds can reach 80%. To get the appropriate seed bulbs, the cultivation process is distinguished from garlic which will be used as consumption. One of the techniques carried out by the Sembalun community to obtain high quality seeds are to plant with a close spacing and use a little fertilizer. This is believed to result in the texture of seed tubers that are really dense, even though the size is not too large.

After harvesting, the prospective seeds are stored by tying every ten seeds, then dried on the ground by hanging and airing for about one week. After that the seeds are hung in the kitchen with the fumigation process from the kitchen fire. The goal is to kill pathogenic germs. Smoked garlic is then stored in a warehouse by hanging for six months before planting. Six months is believed to be the optimum time to ensure there is a growing point and garlic can grow well.

The custom of Sembalun community in using good seeds is in accordance to the statement which states that the productivity of garlic farming is determined by the quality of the seeds used [6]. A good garlic seed must fulfill the requirements, which are free of pests and diseases, the base of the stem is full and hard/dense, cloves are strong and the cloves are large for seeds of 1.5 to 3 grams. Storage can be done by hanging the seeds with natural fumigation from kitchen fire, although it is stated that it could be that the fumigation process can damage the garlic bulbs and give a brownish color so that it is less attractive.

At present, the seed preparation process does not fully follow the rules that used to apply. The seeds used by the community cannot be differentiated between the ones for seed or for consumption. The seeds are also not known for sure how old they are, only from the point where they grow. Seed storage is done in the warehouse and stacked for quite a long time so that the temperature of the seed is high enough and can turn off the growth point. This causes the opportunity for seeds to grow well will be even less.

3.2.3 Soil Tillage

The habit carried out by the Sembalun community before planting garlic is to do soil tillage for quite a long time. If planting is done in June, the tillage process has been carried out since May. The soil is prepare for approximately two weeks, then aerated. After that the soil is leveled with tools from wood until the texture is smooth and there are no rough chunks, then the soil is allowed to dry again. Lapse of a week later the ground was beaten again with a wooden instrument so that it was flat. This is done so that the microbes that live in the soil die from the sun, and the air can circulate properly. The soil structure which has crumbs after leveling will also allow better water uptake and drainage, as well as the absorption of fertilizer given. After the soil is processed, beds are made. Between beds are made enough drainage channels to drain the water so that the water does not pool.

The above habits are states that the soil tillage must be done to be completely loose, after that it is left for about one week to dry, after that the chunks are crushed and flattened and then left again [6]. A few days later the soil is plowed back a second time to make the soil texture smoother. Thus, this technique requires a long time but the results obtained will be good because the plants grow on optimal soil. It is different from the conditions that occur today, where the Sembalun community performs very short soil tillage, i.e the soil is cleared of weed remnants using herbicides. Three days later soil tillage using a tractor, and immediately made beds so that they were ready for planting. This condition allows the development of pathogenic germs that are still present in the soil, the texture of the soil is still rough causing water and nutrient uptake is not optimal, and root growth is also inhibited.

3.2.4 Post-harvest treatment

In Sembalun, the way farmers handle post-harvest is traditionally carried out. Harvesting is done by carefully removing all parts of the plant, then the dried roots and leaves are removed and leaving only the base of the leaves. After harvesting, the garlic is then placed in the bamboo to be dried in the sun for 30 days. Drying is also generally carried out by farmers in the room using wood smoke (fumigation). After drying, garlic is stored in a warehouse or placed on bamboo mounted on the ceiling of the house. Storage in this way makes it easy for every household to use garlic as consumption or as a seed. Garlic, which is used as a seed, is a crop from the planting season in June from large paddy fields, while planting in January to April is generally only produced for consumption. Generally, every garlic farmer in Sembalun has space in his own house to store his crops. Storage of garlic is an important problem faced by farmers, due to shrinkage weights can reach 50% more.

4. Conclusion

Local wisdom of garlic cultivation in Sembalun is when planting garlic should be done at the end of the rainy and windy seasons, handling prospective seeds has been done since starting planting in a different place by planting garlic for consumption, storing seeds in the above home kitchens accompanied by washing up for pest and disease as well as optimal soil tillage, drying the soil with sunlight and improving the soil texture to be soft. This local wisdom can be used as a policy to improve the productivity of garlic in Sembalun in the future.

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Aknowledgments

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