
Adaptation of Farmers in Rice Cultivation at Dry Season in Gunungsari Village (Bojonegoro-East Java) For Learning Source

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ABSTRACT

Gunungsari is one of village in Bojonegoro located around the Solo River downstream. Farming areas experiencing water shortages because the monthly rainfall is always dry in dry season. Rice can't live without adequate water. That seasonal condition making farmers must think to get way to continuous rice cultivation. This paper aims to determine farmer adaptation in rice cultivation at dry season for raw data in the learning source. This research is survey with population 385 heads of family farmers. Samples were taken by proportional random sampling technique is 80. Collecting data use observation, interviews, and documentation. Data analyzed with descriptive quantitative, then information will develop in the learning source in the next research. The results that the form of adaptation, include: (1) farmers began planting in June when river water still available. (2) To hold water by way pumping river water to Solo River to secondary, pumped again to tertiary, then flowed to rice fields. (3) Farmers must set aside 16% of the yield to pay for pumping effort. This research result can become lecturer learning source both in Biology Education department and in Geography Education department. Biology Education is specially relating in the plant matter. Geography Education is specially relating in the agriculture geography matter. Development Learning Source for higher education must begin from research like this research. Learning source with information from the research can learn more contextual and easier to understand.

Keywords: Adaptation of farmer, dry, learning source, rice cultivation.

Introduction

Physiographic Gunungsari village is located in the middle of the anticline zone (Kendeng karst hill). Soil is formed from the weathering of karst and mixed with the deposition of Solo River. Land classified as very fertile and good for the rice cultivation area. The soil characteristics of the karst bed rock dominant clay textured means the dry season will be formed much fractures. According to Bemmelen in (Forestier, 1998) Java has seven physiographic units, one of the unit is central anticline zone (Kendeng hills).

Indonesia location is between two continents (Asia and Australia) make strongly

influenced by wind movement between it. This wind is called seasonal winds changing any given period. Seasonal winds come from the northeast and southeast winds are experiencing turning force due to the rotation of the earth. According to Kuspriyanto and Sulistinah (2008), the monsoon wind is the wind that blows in the opposite direction every half year.

The location of Java near the equator so as to obtain the influence of monsoon winds that move from 23,5o latitude towards the equator. Monsoon winds that blow from the continent of Australia did not bring moisture causing dry season. According to

Gandakoeshoemah (1975), Java is divided into two seasons: rainy between November to April and the dry season between May and October.

Land will be formed much fractures occur when rainfall is minimal. Seasonal rainfall in Indonesia will be reduced during the dry season. Based on the profile Gunungsari Village (2010), the amount of the average rainfall is 2400 mm/year, was dominant from October to March. According to Indonesia Central Statistics Agency (2007-2011), that in dry season in Gunungsari village including dry months or rainfall below 60 mm which occurred from May to September.

Gunungsari village has 350 hectares area with 135 hectare agricultural area, in the dry season water shortages every year. This is because the monthly rainfall less than 60 mm. Land in the fields much fractures, dusty and dry. Farmers plant the agricultural plant that not required a lot of water before 1990. Farmers switched to plant rice after 1990 because every rainy season often failure harvest due to seasonal flooding. This causes their adaptation efforts for rice crops require a lot of water.

Also need to know farmers motif choose rice. Farmers effort are eradicating pests that they can live sustainably in rainy season, because it available food in dry season. Those efforts are a farmer adaptation to dry season is interesting to know.

Agriculture is the largest sector of livelihood of the villagers Gunungsari and still the main livelihood of the population in Indonesia. Based on the Gunungsari Village profile (2010), showed that as many as 1.926 people (72, 97%) work in the agricultural sector (farmers and farm workers). The Gunungsari village conditions is experiencing water shortages in the dry season requires farmers to find a way out in order to resume the

continuity of rice cultivation. This paper aim to determine farmers adaptation in rice cultivation at dry season. Research impact can get lecturer learning source in Biology Education and Geography Education Department.

Methodology

This research is survey. This research was conducted in the Gunungsari Village Baureno District, Bojonegoro, East Java. The research was conducted in February 2015 to investigate the rice cultivation in 2013, 2014, and 2015. These research populations are all heads of family farmers (385). Samples were calculated using the Slovin formula in (Setiawan, 2007), get 80. Samples were taken by proportional random sampling technique.

The data consists of primary and secondary. The primary data is information of farmer adaptation rice cultivation at dry season obtained by observation and interviews. Secondary data were obtained with the documentation, include: village monographs, administrative maps, farmers, and irrigation organizations. Data were analyzed with descriptive quantitative equipped percentage. Percentages are from the average over three years.

Result and Discussion

All farmers have a plantings schedule. Calculation used is the month and the season on the basis of experience. Early time rice cultivation in the dry season the majority of farmers in May weeks 4th until June weeks 1. Schedule not much changed every year for planting schedule has been determined simultaneously by the groups.

All farmers chose rice as a crop that is planted in dry season. Rice plants become

the primary choice and the most during the past three years due to several reasons. The reason is, first because there was water on the area of 74%, both easy care 11%, and the third combination habit, there is water on the area, and easy care (each large 1%).

Farmers majority choose ciherang rice varieties (82%). Farmers interested ciherang because harvest result more than other varieties (bagendit and IR 64), and more resistant to pests, especially rats. Ciherang easy to sell because demand by collectors for reasons delicious taste rice.

The efforts of farmers to plant rice seedlings in the dry season showed that all use the way the seeds and make hatcheries. Planting after seeding diverse ways, such as: plant with rope 60%, without rope 28%, and 12% jajar legowo.

The highest efforts seed way is buy (82%), held their own (15%), and the combined (3%). Seed purchased in the farm shop, intent to hold itself was set aside part of harvest result. The mix is a combination between buy and hold their own.

Watering is important in the adaptation of rice in the dry season. Farmers' way to fill water needs by pumping river water using diesel collectively as much as 87%. The rest (13%) to make the flow through the water source (spring) individually.

Pest is one issue that must be faced by farmers in the rice plant maintenance efforts in order to achieve maximum harvest. Pests that attack the farmers in the dry season are a rat by 65%, leafhoppers (27%), and pest snails (1%). The way to combat rat pests with spray the anti rat liquid by 79%, the rest is eliminated by way of poisoning.

All farmers (100%) didn't have problems in terms of fertilization. Rice productivity ciherang varieties average of 60.8

quintals/hectare, IR 64 43.6 quintals/hectare, and bagendit 55 quintals/hectare. inpari 2 of 62 quintals/hectare. Farmers planted more ciherang because great productivity and safer from the rat.

Discussion

The dry season is between May and October. Farmers begin planting rice in May end to ensure seasonal flooding had completely subsided and considering the availability of water in the dry season from the river. There are 13% of the farmers to plant one month in advance because the location of the fields near the settlement Karan village (higher), meaning that the first low tide.

Rice planting period lasted for 4 months starting from June to September. Activities carried out, namely; (1) sowing seeds in late May to early June, (2) seed wait until the age of 30 days, while waiting for the seeds to grow rice field had tractor alternately, (3) seeds that have been aged 30 days to be uprooted to be planted in June of week 3rd and week 4th, (4) rice experienced a period of growth after planting for 3 months or 90 days on week 4th June until week 4th September, and (5) in week 4th September rice ready for harvest. According to Gandakoesoemah (1975), explains that this type of rice according to long in the field, Java is divided into two categories: namely deep rice in the 5 to 7 months old, and early maturing rice with 3 to 5 months old.

Began distributing seeds to two weeks before harvest the rice crop water requirement is met by the pumping system, two weeks before harvest dried to prevent paddy rice seed formation perfectly. Pumping system is an irrigation system using a pump. This cycle is done by 87% of farmers who follow the irrigation pump with a difference of one to two weeks because farm workers who carry

out the repeal of seeds, tractors, planting, and harvesting hired by farmers in turn. While the 13% who do not follow the pump irrigation start planting rice in April or sooner one month from the others.

Plants that don't require much water no planting again by 90% farmers after 1990. This because since the irrigation effort irrigates many rice fields resulting flow of water around the another field. Seepage of the paddy that do plants not require a lot of water such as: maize, tobacco, chili, soy, cassava, groundnuts and beans. Seepage difficult to avoid because of the water pumped from the river lots and the resulting soil in rice fields saturated.

Rice varieties determines the planting period. Rice varieties used by farmers in the dry season is dominated ciherang. There are several varieties are also grown by farmers like bagendit, IR 64, and inpari 2. Farmers do not think of rice varieties associated with dry season water conditions, for example by making use of gogo and huma rice that need little water. This is because the rice water needs has been pursued farmers through river water by using a pump.

The situation caused the main reason use the varieties of rice are much result, pest resistance, and ease of sale. Seed paddy bought by farmers at the farm shop. Based on the Indonesia great hall of rice research (2008), that bagendit rice have between 99-105 cm tall with a number of productive tillers between 12-13 stem, ciherang have 107-115 cm tall with a number of productive tillers 14-17 stem, whereas IR 64 has a 90-100 cm with the number of tillers 20-35 stem.

Farmers who set aside for replanting crops farmers claimed their productive tiller number was reduced but not much. Rice tall also decreased, in part can invite pests

sparrows. Farmers use seed crops for one to two times only, and then buy again.

Typical of growing rice way using irrigation efforts/irrigation is by nurseries. Another way to rain reservoir field rice by making holes with sharp edges of wood, and rice seedlings inserted in each hole. Farmers in the Gunungsari use the nurseries. According to Gandakoesoemah (1975), the way people working the fields to plant rice, initially created wet soil and then worked to grow or make the nursery.

Rice became the type of plant chosen by all the farmers besides some also choose corn and tobacco. The dry season is less water requires farmers to effort water for rice plants that need a lot of water during his life. The water requirement of rice crops in the dry season pursued with pumping systems, which use the river by using a pump. According to Wisnubroto *et al.*, (1983) the rice plant can be classified as hydro facultative. According to Gandakoesoemah (1975), water for irrigation taken from: rivers, lakes springs, reservoirs, and from land water.

In general, the water from the river is better than reservoirs because it contains good sludge for plants. Reservoirs created to help the lack of water and to irrigate land in the dry season. Gunungsari farmers in the majority used the river that connects directly to the Solo River to irrigate their farmland by using water pump with 24 and 1 mains pump. While there are 13% of the farmers in the Karan village utilizing the water resources of small reservoir (gong) to irrigate the fields. Gong reservoir water utilization is not using the tool, simply by improving the flow of the spring toward the fields.

There is irrigation managed jointly by farmers, but mostly as a member. Type of irrigation applied was half technical irrigation because the water distribution can be

arranged but the number of flow can not be measured mathematically (based on experience). According to Gandakoesoemah (1975), said half technical irrigation area if the distribution of the water can be arranged but the amount of flow can't be measured.

Irrigation use the river as a main source of water use means water is pumped from the primary rivers (Solo River) using the main pump to the secondary stream (Semarmendem), from secondary river pumped into tertiary channel made farmers, tertiary channel water was appointed to the highest rice fields, the rice field entered the water with a way to break down the rice fields bund, and flowed into the rice fields surrounding. According to Gandakoesoemah (1975), water from rivers or reservoirs are channeled into the main and then distributed to the secondary channels, from here distributed again to the tertiary.

Irrigation fund system an amount of 20% when held by businessmen from Mojokerto, and chance to 17% of the harvest since 2012. Farmers to set aside part of the irrigation in the fields that will be harvested by the working group. According to Pusposutarjo (2001), for each get benefit responsible for the sustainability of existing irrigation systems (networks and institutions), then in addition to operating expenses also burdened with the maintenance of which is proportional to the benefit gained.

Many pests attacking rice plants in paddy farmers because pest will to survive by foraging in the places provided food. Planting rice in the dry season rarely done in other areas in Bojonegoro far from water sources and only depend on water from rain. So the rice in the dry season is interest pests to attack.

Pests that attack is: the rat, leafhoppers, sparrows, and snails. Rat eating young rice

stem (the majority) and the harvest time. Although the level of damage caused by rat is high but farmers still trying to stitch back the damaged paddy rat and eradicate the drug (pesticides). According to Hernanto in Soetriono *et al.*, (2006) eradication of pests and diseases means to eradicate pests that can degrade the quality of the product, required treatment thoroughly and carefully so as not to lead to failure. According to Gandakoesoemah (1975), the arrival of rats to the rice fields are hundreds and consuming of rice stem, to avoid this interference fields completely soaked so that the rats died or fled to bunds, where rats can be eradicated.

Paddy in the Gunungsari village had been flooded before and after planting, but the water entering the field is still lacking so that rat are still able to attack. If the rice field high flooded all, then the rats that are destroying the rice will be reduced because it could not swim. Leafhopper pests attacking rice stem and eat the young grain. To attack leafhoppers by farmers is use spraying with leafhoppers opposite.

All farmers who plant rice do not have problems in terms of fertilization. Fertilization is twice by sown way to rice during the rice growth period. Fertilization first performed at the age of 7 days after the rice planting. Farmer do fertilization after ensuring rice truly alive. The second fertilization do after 15 to 20 days from the first. Farmers cultivate at that time so that optimal growth period, but a month before harvest farmers are not doing fertilization. This can lead to less than optimal conception time. According to Hernanto in Soetriono *et al.*, (2006) the provision not organic fertilizers, generally 15-30 days after planting to encourage vegetative growth, fertilizing the next 1 month before flowering as stimulating the formation of flowers and fruit.

Harvest result receive by farmers ciherang average of 6.08 ton/hectare. Productivity IR 64 average of 4.36 ton/hectare. Bagendit productivity by an average of 5.5 ton/hectare, planted in the wetland and the result is always more 5 ton/hectare. Inpari 2 productivity by an average of 6.2 ton/hectare. Farmers ought to consider changing cropping patterns varieties from ciherang to inpari 2 because harvest result different 0.12 ton/hectare. According to Indonesia large study hall rice crop (2008), yields of rice varieties ciherang are in the range of 5 to 8.5 ton/ha, IR 64 around 5 ton/ha and has a potential of 6 ton/ha, the average bagendit are in the range of 3-5 ton/ha (dry land) and 5-6 ton/ha (wetland).

Harvest result I is dried grain and ready to sell without having to be dried with high sale price in dry season because other areas plant corn and tobacco. The grain selling price is Rp.4.000/Kg (2013), Rp.4.500/Kg (2014), and Rp.4.700/Kg (2015). There is no difference price between variety, but the difference is the ease of sale. Ciherang is very easy to sell and more sought after buyer than other variety of rice because the taste is delicious. Bagendit is difficult to sell because it is sticky.

Geography in which there is physical determinism and possibilities understand. Physical determinism found in natural conditions of a region largely determines the nature, character and lifestyle of the population occupying the area. Possibilities explained that the crucial progress of a region is the level of ability of the population, whereas nature only provides possibilities to be processed and utilized for human life. According to Utoyo (2007), the geography development influenced by the thought, there are physical determinism and possibilities.

Adaptation of farmers in the Gunungsari village included in the possibilities that man's

ability to manage nature. The ability is seen from the efforts of farmers to hold water to the fields during the dry season to meet the needs of rice plants that need a lot of water. This is a consequence of farmers due to the switch from a plant that does not require much water to plants that need a lot of water (rice). Farmers switched to rice because it is easier in maintenance, can be consumed alone, the selling price of rice is high in the dry season (above Rp.4.000/kg), and easy to sell.

The technology creation ability by humans, make life easier and lighter. Human achievement in the application of technology, making technology as the foundation for a conviction even fulfillment necessities of life. Humans do not be passive or resigned to accept whatever the vagaries of nature. According to Blance (1919), nature is no longer decisive, but the production process is chosen man as the choice of the alternatives given by nature in the form of soil, climate, and space in a region.

Adaptation farmers cultivating rice in the dry season shows that humans are not resigned to the state of nature and deal with technology. Farmers are not resigned to the situation during the dry season a little water with exploit technology in the form of pumps and half technical irrigation way by making simple dams and channels.

All information research above can include at lecturer learning source in Biology Education and Geography Education Department. Learning process with information from the research can learn more contextual and easier to understand than information from text (example books). The research results include the intensive agriculture ways and information about variety of plant (rice). Intensive agriculture ways is one of matter in agriculture geography subject. Information about variety of plant (rice) is one of matter

in Biology subject at university. This research information can teach by lecture in form of power point presentation and module.

Conclusion

Adaptation farmers in rice cultivation in the dry season: (1) Farmers planted soon after seasonal floods recede ensure that the stock of water the river can be utilized to the maximum. (2) Type of selected plants are rice because it is easily treated and stable selling prices; variety is the most sought ciharang; how to plant seedlings to nurseries and planted. (3) Watering with half technical irrigation pumping water from the Solo River and simple irrigation by utilizing the flow of spring gong reservoir. (4) Rat pest become barriers adaptation measures. (5) There is no difficulty in fertilization. This research result can become lecturer learning source both in Biology Education department and in Geography Education department. Suggestion can give in this research. In order for farmers to change cropping patterns once every three years for other crops like tobacco in order to break the chains of life of rice pests such as: rodents, leafhoppers, sparrows, and snails are kept alive as a result of planting rice throughout the year.

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