Application of Appropriate Technology for Automatic Bird Repellents and Automatic Fish Feed in Minapadi Systems in Beutong Nagan Raya District

[1] Mahendra,[2]Muhammad Arif Nasution

[1]Aquaculture study program, Faculty of Fisheries and Marine Sciences, Teuku Umar University, Indonesia
[2]Aquatic Resources Study Program, Faculty of Fisheries and Marine Sciences, Teuku Umar University, Indonesia
Corresponding author: e-mail: mahendra@utu.ac.id
Co-author : arifnasution@utu.ac.id
Submitted:20/7/2021 **Conferrence:** 17/10/2021 **Accepted:** 25/3/2022 **Published online**: 8/3/2022

Abstract: The purpose of this research-based service program is to apply the research results of the proposing team's research for community empowerment. The application of the research results was carried out on the program of application of appropriate technology for automatic fish feed and automatic bird repellent on the Minapadi jajar legowo system which is a system of planting rice with fish cultivation in one rice field area simultaneously and the rowing legowo planting system with a spacing of 25 cm. . The technology used is automatic feeding and automatic bird repellent. Automatic feeding is done by using a mini water pump that has been modified with the help of a digital timer so that the feed automatically dispenses the feed at the time we specify, which is 3 times a day. The second technology is automatic bird repellent using extracts of herbal ingredients (jengkol) with the help of an automatic sprayer. This technology aims to increase the income of farmers with high productivity of rice yields and increase local fish production. The activity was carried out for 5 months in Beutong Nagan Raya District. The observed results include rice production and fish production in the Minapadi system. The yield of rice production (ton ha^{-1}) is (3.04 ton ha^{-1}). While the average weight of fish is (24.25 g). The activity was carried out for 5 months in Beutong Nagan Raya District. The observed results include rice production and fish production in the Minapadi system. The yield of rice production (ton ha^{-1}) is (3.04 ton ha^{-1}). While the average weight of fish is (24.25 g). The activity was carried out for 5 months in Beutong Nagan Raya District. The observed results include rice production and fish production in the Minapadi system. The yield of rice production (ton ha^{-1}) is (3.04 ton ha^{-1}). While the average weight of fish is (24.25 g).

Keywords: minapadi, legowo, local fish, automatic fish feed, automatic bird repellent

Introduction

UFish cultivators as micro entrepreneurs in Nagan Raya Regency have begun to develop, however sadly The types that are kept are foreign fish introduced from outside Aceh and evenoutside the country. This condition puts pressure on the local native fish population. Meanwhile, Aceh also has the potential for native fish that are not inferior both in terms of quantity and quality, for example, succulent fish (Osteochilus vittatus), and giant prawns (Macrobracium rosenbergii) (DKP Aceh, 2015). According to the research results of the research team, the production of local fish that has been successfully increasedcover fish (Mahendra and Supriadi, 2019), giant prawns (Mahendra, 2015), banana shrimp (Mahendra and Gazali, 2017) and local snakehead fish (Saputra and Mahendra, 2018),

Potential and business opportunities for prospective entrepreneurs are very potential, because the place location This activity is very strategic, namely having a source of irrigation water

whose needs are always continuous and the average human resource worker in the area is a farmer and fish cultivator. increase the income of farmers and fish cultivators.

Group business partners (partners) will make business management, especially rice and fish production to improve the economy, but pThe problems faced by partners are have not received knowledge and science that can increase their production results. This millennial technology isa system of growing rice with fish cultivation in one rice field area at the same time. millennial technology (Minapadi legowo with local fish) which is a system of growing rice with fish cultivation in one rice field area at the same time. This technology aims to increase farmers' incomes with high productivity of rice yields and increase local fish production.

The priority problems of the partner groups of prospective new entrepreneurs are have not received knowledge and science that can make prospective entrepreneurs to become entrepreneurs with the potential of the area. The mutually agreed solution in this activity is to take advantage of the existing potential by implementing Technology Minapadi legowo with local fish which is a system of growing rice with fish cultivation in one rice field area at the same time. The increase in rice and fish production is carried out with automatic feeding technology by using a mini water pump that has been modified with the help of a digital timer so that the feed automatically dispenses the feed at the time we specify, which is 3 times a day. The second technology is automatic bird repellent using extracts of herbal ingredients (jengkol) with the help of an automatic sprayer.

Methods

Activity Location

The implementation of this activity is carried out in rice fields Meunasah Kreung Village, Beutong District, Nagan Raya Regency, Aceh Province.

Materials and tools

The materials used in this activity are: MAPAN P-05 rice seeds, urea fertilizer, potassium fertilizer, local fish seeds, jengkol, DMA (anti-weed medicine), nets (paddy field fences), and pellets. The tools used in this research are: Hand Tractor, automatic feeder, automatic bird repellent, hoe, bucket, scale, ruler, machete, rapiah rope, tarpaulin, plastic folder, label, meter, bamboo stake, safety net, paper, camera, and stationery.

Activity Procedure

The first technological activity was carried out in processing the land in the rice fields which would be used as cultivationMinapadi system fish using a hand tractor which is repeated 3 times to loosen the soil and facilitate rice planting. Furthermore, the formation of kemalir for the maintenance of local fish with a width of 50 cm and a depth of 50 cm. The rice fields are fenced with nets so as not to be attacked by pests and diseases in local fish and rice. Before the rice planting process is carried out, first the formation of straight and clear planting lines is carried out byinterestinga planting line tool that has been prepared in advance and assisted by a rope that is stretched from end to end of the land. Then prepare the rice seeds used are superior varieties (MAPAN P-05) for 17 days. The rice seeds used are 2 seeds per planting hole at the intersection of the lines that have been formed. The process of planting rice using

the Legowo 4:1 and 2:1 rice cropping system which is the best result (Bobihoe, 2013) which is for a 4:1 method of planting rice which has 4 rows of plants then interspersed with 1 blank row where the spacing is 25 cm. The local fish distribution process was carried out with a stocking density of 1000 fish/plot after 30 days of rice planting.Givepellet feed type F-999 which is inserted into the automatic tool. Harvesting is done when 90% of the grain turns yellow or is carried out 10 days before the rice harvest by drying the paddy fields first then fish are caught slowly by shifting the fish and shrimp completely.

Results and Discussion

Condition General Devotion Area

Agriculture is a processing business for the cultivation of food crops. Agrarian communities rely on the agricultural sector as their main livelihood. Rice fields are permanent (non-shifting) agriculture that uses wetlands that are regularly irrigated. Broadly speaking, the livelihoods of the Beutong people are farmers, with a very large area of land making it easier for local people to cultivate crops, it also benefits from the irrigation process. which is very adequate so as to produce a fairly high rice yield. The data can be seen in Tables 1, 2, and 3 below:

Table 1. Irrigation irrigation in Beutong Nagan Raya District

	Kecamatan *Subdistrict*	Irigasi *Irrigation*	Non Irigasi *Non Irrigation*	Jumlah *Total*
	(1)	(2)	(3)	(4)
1	Darul Makmur	64,0	740,0	804,0
2	Tripa Makmur	60,0	391,0	451,0
3	Kuala	1 179,0	482,0	1 661,0
4	Kuala Pesisir	200,0	271,0	471,0
5	Tadu raya	80,0	358,0	438,0
6	Beutong	3 001,0	324,0	3 325,0
7	Beutong Ateuh Banggalang	395,0	174,0	569,0
8	Seunagan	2 031,0	315,0	2 346,0
9	Suka Makmue	2 349,0	302,0	2 651,0
10	Seunagan Timur	3 284,0	300,0	3 584,0
	Nagan Raya	**12 643,0**	**3 657,0**	**16 300,0**

Source: BPS Nagan Raya (2017)

The data above shows that Beutong District is a district that has an extensive or large irrigation water system for processing waters in rice fields, which is 3001 ha, which is the second largest after East Seunagan District. This great potential is only used for (single) rice production without the integration of other types, so that the application of the (local) fish

farming process is very appropriate in the area which can increase the income of local farmers.

Table 2. Lowland rice yields in Beutong Nagan Raya District

Jenis Tanaman	Luas (Ha)	
	Tanam	Panen
(1)	(2)	(3)
1. Padi Sawah	5085	6189,1
2. Kedelai	0	21
3. Jagung	39	58
4. Kacang Tanah	8	6
5. Kacang Hijau	0	0
6. Ubi Kayu	3	3
7. Ubi Jalar	1	5

Source: BPS Nagan Raya (2017)

Table 2. regarding lowland rice yields, shows that most of the livelihoods of the Beutong people are monospecies farmers (rice) as seen from the data above, with a yield of 6189 ha which is the largest type of rice plant compared to other crops. It is very appropriate to do a service program in Beutong District to increase farmers' income by implementing more than one type, namely rice and local fish with a fish cultivation system in Minapadi.

The results of the area of paddy fields in Table 3, show that Beutong District is the District with the second largest rice field area after Seunagan Timur, which is 5571 ha. This shows that the Beutong sub-district has enormous potential to implement the Minapadi system for fish and rice cultivation, so as to increase the income of local farmers.

The results of this activity are very appropriate to be carried out in Beutong District by implementing local fish farming with the Minapadi system, this is because the area has never implemented the Minapadi system, so farmers can increase their income and also make pilot villages to apply the model to other villages that have potential. the same one. Fisheries data in the Beutong area (Table 4) show that the yield of fish cultivation is very small and it has not even been cultivated in ponds, let alone in rice fields (minapadi). So that this activity is very treasured for local farmers and also throughout Nagan Raya.

Table 3. Rice field area in Beutong Nagan Raya District

	Kecamatan *Subdistrict*	Lahan Sawah *Paddy Land*	Lahan bukan Sawah *Non Paddy Land*
	(1)	(2)	(3)
1	Darul Makmur	876,2	0,0
2	Tripa Makmur	428,0	146,0
3	Kuala	2 590,1	112,0
4	Kuala Pesisir	536,7	0,0
5	Tadu raya	713,6	5,0
6	Beutong	5 571,0	99,0
7	Beutong Ateuh Banggalang	380,0	0,0
8	Seunagan	3 902,2	109,0
9	Suka Makmue	4 533,9	102,0
10	Seunagan Timur	6 009,3	63,0
	Nagan Raya	**25 541,0**	**636,0**

Source: BPS Nagan Raya (2017).

Table 4. Utilization of fisheries in Beutong Nagan Raya District

	Kecamatan *Subdistrict*	Perikanan Laut *Marine Fisheries*	Perairan Umum *Inland Water*	Jumlah *Total*
	(1)	(2)	(3)	(4)
1	Darul Makmur	14,35	136,65	151,00
2	Tripa Makmur	65,50	135,20	200,70
3	Kuala	-	58,25	58,25
4	Kuala Pesisir	824,40	73,81	898,21
5	Tadu Raya	249,40	136,50	385,90
6	Beutong	-	46,24	46,24
7	Beutong Ateuh Banggalang	-	21,36	21,36
8	Seunagan	-	74,68	74,68
9	Suka Makmue	-	91,23	91,23
10	Seunagan Timur	-	40,03	40,03
	Nagan Raya	**1 153,65**	**813,95**	**1 967,60**

Source: BPS Nagan Raya (2017)

Minapadi System Fish Cultivation Process

The process of fish cultivation in rice fields that will be used as fish farming in the Minapadi system should be carried out in rice fields where the water discharge is always available all the time or using irrigation. The location used is in accordance with the requirements for fish cultivation with the Minapadi system, at the activity location having an adequate area of irrigation (Table 4) the use of irrigation in the Minapadi system, in addition to irrigating rice fields as well as for raising fish and also the latest water quality will make fish growth very high. good. This is in accordance with the opinion of Sudiarta et al., (2016) which states that the Minapadi model is efficient and effective enough to be applied to irrigated rice fields where the availability of water is always there for the growth of rice and fish.

The conditions for a good location for Minapadi are then used as a pilot Minapadi rice field area. The rice fields used per plot are 25 x 25 m2 as a pilot. Before starting the activity, first loosen the soil using a hand tractor. This aims to evaporate toxic gases and nutrients in more fertile soil and to facilitate rice cultivation. This rice field hand tractor activity was carried out 3 times in wet/humid/watery conditions. The loosening of the soil at the activity site with a hand tractor can be seen in Figure 1. The purpose of tillage according to Nurhayati et al., (2015) states that tillage in Minapadi has a dual function, namely to prepare for the growth of rice, as well as to grow microorganisms as fish food.

Figure 1. Soil tillage with a hand tractor

In addition to cultivating paddy fields with a hand tractor, it is also done to make kemalir using a hoe (Figure 2). This is aimed at not only being a container for fish rearing to avoid direct heat from the sun, but also to deal with pests such as snails and to make it easier to harvest fish. According to Hadi and Astuti, (2013) the purpose of kemalir is to protect fish from pests and the dangers of drought caused by high evaporation. This ditch or kemalir is made transverse/horizontal and parallel to the embankment with a width of 1 meter and a depth of 50-70 cm. Formation of kemalir for the maintenance of local fish with a width of 50 cm and a depth of 50 cm

Figure 2. Making kemalir with a hoe

Furthermore, before the rice planting process is carried out, first the formation of a straight and clear planting line (legowo) is carried out by pulling the planting line tool that has been prepared previously (Figure 3) and assisted by a rope that is stretched from end to end of the field.

Figure 3. Formation of planting lines (legowo) with a cropping line scraper

Seeds The rice used is the MAPAN P-05 superior variety. Rice seeds used as many as 2 stems per planting hole at the intersection of the lines that have been formed. The process of planting rice using legowo. The fish stocking process was carried out in each plot per species with a stocking density of 500 fish/plot after 30 days of rice planting. This aims to avoid drugs or fertilizers. Spreading fish seeds is done in the afternoon slowly so that the fish do not experience stress due to environmental changes.

Application of Automatic Bird Repellent And Automatic Fish Feed

According to Hadi and Astuti, (2013) pests that attack rice and fish are birds, snakes or water civets/beavers and golden snails (Hidayat, 2018). Pests in addition to destroying/eating/competitors are also disease carriers/agents for fish life. Pest prevention carried out by farmers in Beutong Village includes simultaneous planting, the use of scarecrows and the use of nets.

Prevention of pests, especially birds, in this service program activity is to prevent pests (birds) with an automatic bird repellent using a solution of herbal ingredients (jengkol, garlic, bintaro, and shaved) with the help of an automatic sprayer.

Figure 4. Application of automatic bird repellent in paddy fields

The tool uses a solution of herbal ingredients (jengkol, garlic, bintaro, and shaved) with the help of an automatic sprayer. The tool uses a battery to move the lever which is set for 10 minutes every day. Each plot (25x25 m2) is given 6 tools to repel. In addition to bird pests, the aroma that comes out of herbal ingredients can repel rats, leafhoppers and other insects.

Figure 5. Automatic feed technology in paddy fields.

Meanwhile, automatic feeding is done by using a mini water pump that has been modified with the help of a digital timer so that the feed automatically dispenses the feed timewhat we set is 3 times a day. The tool is set according to the weight of the fish, every 1 second the tool will issue a pellet of approximately 15 grams. The plate used is the FF-999 type.

Conclusion

The technology used is automatic feeding and automatic bird repellent. Automatic feeding is done by:usea mini water pump that has been modified with the help of a manual timer so that the feed automatically releases the feed at the time we specify, which is 3 times a day. The second technology is automatic bird repellent using extracts of herbal ingredients (jengkol) with the help of an automatic sprayer. This technology aims to increase farmers' income with high rice yields and increase fish production.

References

Nagan Raya Central Bureau of Statistics. 2017. Nagan Raya in Numbers. Publisher BPS Nagan Raya Regency. Pg 227

Center for the Study of Agricultural Technology in West Sulawesi. 2016.Mina Padi Technology with Legowo's Jajar Planting System. Balitbangtan West Sulawesi. Mamuju

Bobihoe, J. 2013. The Legowo Jajar Rice Planting System. Jambi Agricultural Technology Study Center (BPTP). ISBN : 978-602-1276-01-3

Service marineand Aceh Fisheries. 2015. Identification of Fish Types EndemicIn Aceh Waters South West Region (West Aceh). Final report. Banda Aceh

Hadi, P and Astuti, UP 2013. Raising Fish Together with Rice in Rice Fields (Mina Padi), A Double Profit Potential for Farmers in Bengkulu Province. Bengkulu Province Agriculture Service

Hidayat, MN 2018. Enlargement of Tilapia (Oreochromis niloticus) Using the Mina Padi System in the Ngudi Fortune Group, Tawangsari District, Dalangan Village, Sukoharjo Regency. Integration Practices Report. Aquaculture Technology Study Program, Water Resources Management Technology Department, Jakarta Fisheries College

Mahendra and Gazali, M. 2017. Addition of Potassium to Increase Survival and Juvenile Growth of Banana Shrimp (Panaeus Spp). Proceedings of the National Symposium on Fisheries and Marine Affairs. Meulaboh

Mahendra and Supriadi. 2019. Rate Growth of Seurukan Fish (Osteochilus vittatus) Larvae By Giving Poultry Egg Yolks. *Journal of Aquaculture*. 3(1):13-20

Mahendra. 2015. Combination of Potassium Levels and Media Salinity on Juvenile Performance of Galah Shrimp (Macrobrachium rosenbergii de Man). Journal of Tropical Fisheries. 2(1): 55-71

Nurhayati, A., Rustikawati, I and Maulina, I. 2015. Analysis of Sustainable Minapadi Optimization (A Case in Ciparay District, Bandung Regency, West Java Province). Faculty of Fisheries and Marine Sciences, Padjadjaran University

Saputra, F. and Mahendra, 2018. Raising Local Cork Fish (Channa sp.) In Different Containers For Domestication In Arongan Lambalek Area, West Aceh Regency, Aceh Province. Final report. Meulaboh

Sudiarta, IM, Syam'un, E and Syamsuddin, R. 2016. Growth and Production of Rice Crops and Tilapia Fish Production in the Jajar Legowo Planting System. J. Science & Technology, 16(1):70 – 80