Journal
Pengabdian
Teknologi Tepat Guna
Vol. 5, No. 1, Maret, 2024, pp. 61-69

The Organically Cultivation Techniques of Curly Chili in Handayani Farming Group, Sidokaton village, Gisting District

Raida Kartina[1)], Nanang Wahyu Prajaka[2*)], Wika Anrya Darma[3)], Sekar Utami Putri[4)]
Riana Jumawati[5)]
[2*]Correspondent Author (085645645916)

[1, 2, 3, 4, 5] Department of Food Crop Cultivation, Politeknik Negeri Lampung
E-mail: nanangwp@polinela.ac.id

Abstrak: Pengabdian kepada masyarakat ini bertujuan untuk membimbing kelompok tani cabe khususnya kelompok tani Handayani untuk memulai membudidayakan tanaman cabe secara organik pada lahan usaha taninya. Metode pelaksanaan yang digunakan terdapat tiga tahapan yaitu peningkatan pengetahuan, peningkatan ketrampilan dan evaluasi. Peningkatan pengetahuan diberikan melalui ceramah untuk memberi pengetahuan tentang budidaya tanaman cabe organik, pestisida nabati dan pembuatan pupuk kompos berbahan *Azolla pinnata*; dilanjutkan peningkatan keterampilan dengan pembuatan pestisida nabati, perbanyakan *Azolla pinnata* dan pembuatan kompos, demplot tanaman cabe kemudian evaluasi. Bimbingan demonstrasi cara pembudidayaan cabe organik dimulai dari penanaman bibit di bumbungan, aplikasi kompos azolla pada lubang tanam, lalu penanaman cabe dan aplikasi pestisida nabati. Petani menanam cabe pada bedengan yang telah dibuat sebanyak 192 tanaman yang terbagi dalam 6 bedengan. Kemudian dilaksanakan kegiatan pemeliharaan, pengendalian hama dan penyakit dengan aplikasi pestisida nabati, dan panen serta penanganan pasca panen. Monitoring dilakukan 1 bulan sekali terutama di setiap akhir kelompok kegiatan budidaya yang dipraktikkan. Sebagai indikator keberhasilan adalah hasil evaluasi kegiatan terjadi peningkatan pengetahuan konsep pertanian organik 55% dan peningkatan ketrampilan 85%.

Kata Kunci: Pekon Sidokaton, Pestisida Nabati, *Azolla pinnata*

***Abstract**: This community service aims to guide chili farmer groups, especially the Handayani farmer group, to start cultivating chili plants organically on their farming land.There were three stages of the implementation method used, namely increasing knowledge, increasing skills and evaluation. Increasing knowledge was given through lectures to provide knowledge about the cultivation of organic chili plants, botanical pesticides and production of compost made from Azolla pinnata; followed by skills improvement by making botanical pesticides, propagating Azolla pinnata and making compost, demonstration plots of chili plants and then evaluation. Guidance for demonstrations on how to cultivate organic chilies started with planting seeds on the ridge, applying azolla compost to the planting holes, then planting chilies and applying botanical pesticides. Farmers planted chilies in beds that had been made as many as 192 plants which were divided into 6 beds. Afterwards, there were carried out the maintenance activities, controlling pests and diseases with the application of botanical pesticides, and harvesting along with post-harvest handling. This activity would be monitored. Monitoring was carried out once a month, especially at the end of each group of practiced cultivation activities. As an indicator of success, the results of the activity evaluation showed an increase in knowledge of organic farming concepts of 55% and an increase in skills of 85%.*

***Keywords**: Sidokaton village, Pesticide Organic, Azolla pinnata*

Journal
Pengabdian
Teknologi Tepat Guna
Vol. 5, No. 1, Maret, 2024, pp. 61-69

Introduction

Curly Chili (*Capsicum annum*) is one of the important horticultural commodities that is widely consumed by the community as a mixture of cooking spices, as well as a raw material for processing industries such as sauces, chili powder, and dried fruit. Chili has a good economic value due to its extensive use. In addition, chili is also one of the potential export commodities (Santika, 1999).

Curly Chili is more in demand by the community compared to other types of chili, such as bird's eye chili and bell pepper, which is why the demand for large chili in the market is always higher, resulting in highly fluctuating prices due to the limited availability of this commodity in the market. The limited supply in the market is due to the low productivity at the farmer level, which is also accompanied by suboptimal cultivation methods and high virus disease attacks every time chili is planted, triggering high selling prices.

Chili production at the farmer level has only reached between 1.6 tons ha^{-1} to 11.2 tons ha^{-1}, with an average of 5.5 tons ha^{-1}. Meanwhile, chili production can reach 12-15 tons ha^{-1} (Setiawati, 2003), and even Prajnanta (2001) mentioned that chili production can reach 30-36 tons ha^{-1} if cultivated properly. Chili production in one of the planting centers, such as in Bangka, reaches 6 tons ha^{-1} and it was considered surplus (Anwar, 2023).

Sidokaton village is one of the villages in Gisting District, Tanggamus Regency, Lampung Province. This village is located about 3.1 Km from the capital of Gisting District, 35 Km from the capital of Tanggamus Regency, and 70.6 Km from the capital of Lampung Province. Sidokaton village is situated at an altitude of 750 meters above sea level (masl), with an average daily temperature of 26°C. The land consists of plains and, based on a literature review, there are hilly areas, making this village very suitable for planting vegetables, especially chili.

Most of the residents of Sidokaton village work as horticultural farmers (vegetables and bananas). The vegetables that are often cultivated include curly red chili. The type of chili planted by the Handayani women's farmer group is curly red chili, which is suitable for planting in low to medium altitudes.

The current problem with chili cultivation in this area is that the yield is still relatively low, around 3 tons ha^{-1} (Personal communication with the Chairwoman of the Women Farmers, 2023). The low yield of chili commodities is due to, among other things, not carrying out the cultivation steps correctly, for example: the seeds used for planting have not been prepared properly; maintenance such as staking is not maximized and pruning is not applied correctly; soil fertility improvement still relies on the use of inorganic fertilizers such as Urea continuously while currently the availability of fertilizers is limited; and pest and disease control still depends on synthetic pesticides.

Organic farming emphasizes the use of natural (organic) materials, especially in maintaining soil fertility. According to Hakim, et al (1986), the application of organic materials to the soil can help provide nutrients for plants, and most importantly, improve the soil's ability to retain water, improve soil aeration, increase absorption capacity and cation exchange capacity, and increase the number of soil microorganism activities. The use of compost can also increase soil porosity and soil density tends to decrease compared to the

use of chemical fertilizers which cause an increase in soil surface density (Yamada, 1988). According to Prasetyo, et al (2014), the application of organic fertilizer to the soil shows a decrease in soil bulk density and an increase in soil porosity. This condition affects the root's absorption capacity for nutrients provided, thus impacting the amount of fertilizer absorbed by the plants. Therefore, it is necessary to reduce the use of inorganic fertilizers and pesticides by practicing organic farming for sustainable agriculture. Research by Kartina and Sismanto (2016) showed that the use of plant-based pesticides made from neem leaves, galangal, lemongrass, and klerek can delay virus attacks until 8 weeks after planting with an attack intensity reaching 35%. According to Hartono (2003), the curly virus disease can attack chili plants anywhere and anytime in chili commodities.

One potential alternative source of organic material is *Azolla pinnata*, a type of water fern that grows floating in stagnant waters such as rice fields or ponds. This plant can play a role in fixing N (Nitrogen) from the air. *A. pinnata* is 3-4 cm in size, symbiotic with Cyanobacteria in fixing N2. This symbiosis causes azolla to have good nutritional quality, and the soil it grows in becomes fertile and rich in nutrients, especially nitrogen compounds. Azolla has been used for centuries in China and Vietnam as a source of N for rice fields. Azolla's ability to fix atmospheric N_2 can reach 400-500 kg N ha-1 year-1, so *A. pinnata* contains a lot of nitrogen that can be used as a source of organic fertilizer. In addition, azolla biomass also contains elements P, K, and other macro and microelements that can be absorbed by plants (Setiawati, 2018).

Methods

The implementation methods carried out in the community service had three stages: the education phase, the skill enhancement phase, and the evaluation phase.

The education phase was the initial stage in introducing the philosophy of organic farming, the cultivation of organic curly chili by empowering the function of the *Azolla pinnata* plant as a substitute for nitrogen fertilizer and botanical pesticides at KWT Handayani. The method were used by involving lectures and discussions. Before delivering the material, an initial evaluation was conducted to measure the level of knowledge of the target audience by providing a questionnaire. The material that had been presented was then followed by a question and answer session and discussion to measure the participants' response level.

The skill enhancement phase (Psychomotor) that needed to be improved in this activity included the cultivation of organic chili with *Azolla pinnata*, demonstration of making botanical pesticides, demonstration of pest and disease identification, as well as demonstration of harvesting and post-harvesting.

a. The organic chili cultivation using *Azolla pinnata*

In this organic chili cultivation, we provided guidance to the KWT Handayani group through the creation of a demonstration plot measuring 1x10 meters. Before planting on each plot, guidance was given on how to prepare the seedlings, starting from spreading seeds in the nursery, ridging, and maintaining the seedlings in the nursery (Figure 5). This activity was carried out for one month. Concurrently with the preparation of the seedlings, the propagation of *Azolla pinnata* plants was carried out. Propagation was done in two plastic ponds. The purpose of propagation was to ensure that the Azolla used was of uniform age. The distance between plots was 100 cm. Chili seedlings were planted at a spacing of

Journal
Pengabdian
Teknologi Tepat Guna
Vol. 5, No. 1, Maret, 2024, pp. 61-69

60x50 cm. Guidance on the maintenance of chili plants was provided when the plants were 2 weeks old after transplanting. Maintenance included staking when the plants had reached 25 – 50 cm using raffia strings tied in a form "8", pruning of lateral shoots (side-shooting) when secondary branches appear, and fruit pruning.

b. The demonstration of making plant-based botanical pesticides

Plants were used as the base material for botanical pesticides include neem leaves, lemongrass, galangal, and tobacco leaves. The production of botanical pesticides was carried out before planting in the field. The application of botanical pesticides was demonstrated during the control of pests and diseases in chili plants. Spraying of botanical pesticides was done one week after planting with a 25% application concentration.

c. The demonstration of pests and disease identification

This activity was conveyed directly during monitoring and evaluation on the experimental plot of organic curly chili cultivation by observing every sign and symptom of pest and disease attack that appeared on the chili plants.

d. Harvest and post-harvest demonstration

This activity was carried out when the chili plants had entered the harvest period and at the same time provided guidance on post-harvest activities that were carried out by KWT Handayani. It was important to emphasize that in organic cultivation, even up to post-harvest, the use of organic materials was still prioritized. Post-harvest activities included packaging using banana leaves or teak leaves.

The final stage was the evaluation phase. This evaluation was conducted with the aim of identifying and addressing problems faced in the organic chili cultivation activity. Success indicators were measured if at least 80% of the KWT Handayani members had been able to apply the technology provided. The final evaluation of the activity was carried out at the end of the program by distributing questionnaires. The final evaluation was conducted to determine the level of participants' knowledge about organic chili cultivation and any increase in chili productivity.

Results

Based on the evaluation results of the community service activities that were conducted with KWT Handayani in Gisting District, Tanggamus Regency, Lampung Province, the data indicated an increase in knowledge and skills regarding the cultivation of curly chili organically (Figures 1 and 2). The purpose of this evaluation was to identify areas that needed improvement for better sustainability in the future (Ningsih, 2022).

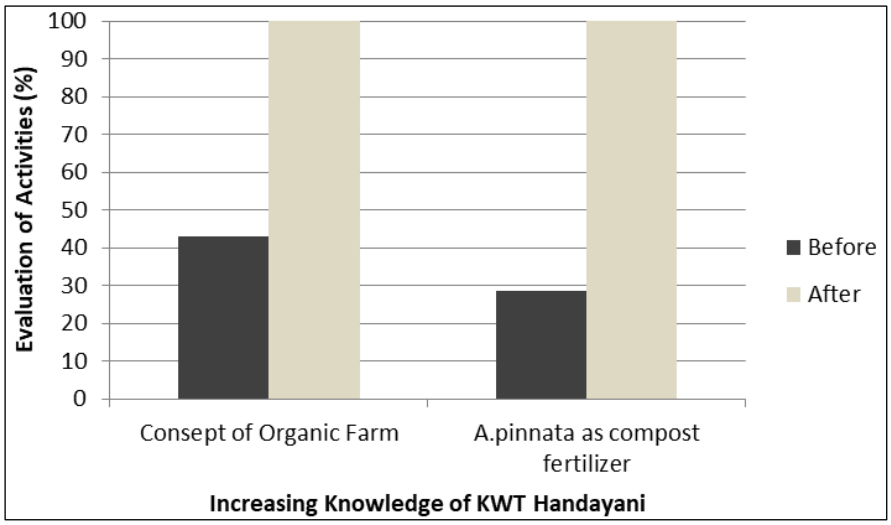

Figure 1. The evaluation of knowledge activities of KWT Handayani

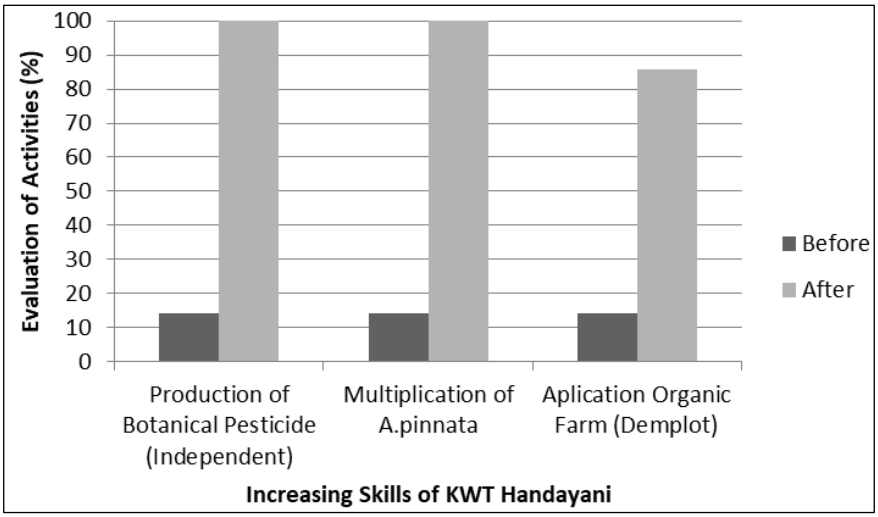

Figure 2. The evaluation of skill activities of KWT Handayani

Discussion

The target of this community service activity was the members of the Women Farmers Group (KWT) Handayani in Sidokaton Village, Gisting District, Tanggamus Regency, regarding the organic cultivation of curly chili. The series of community service activities began with counseling on organic cultivation of curly chili at the home of the KWT chairwoman, Mrs. Tri Wahyuni. Before starting, KWT members filled out questionnaires distributed by the team. The purpose of this questionnaire was to determine the initial knowledge and skills of KWT members regarding the organic cultivation of curly chili, as well as their openness to acquiring and applying new information shared.

The results of the activity evaluation (Figure 1) showed that most KWT members were aware of organic farming, but not all practiced it. There was a 55% increase in knowledge about the basic concepts of organic farming. They reasoned that they were skeptical about the success of farming without using chemicals, especially regarding the expected yields.

Initially, only 28% of KWT members were aware of the benefits of *A. pinnata* as a main ingredient in compost fertilizer. Most KWT members considered it only a water plant. This activity was able to increase understanding that *A. pinnata* is one of the main ingredients in compost fertilizer that can be propagated and applied directly to the cultivation land, with knowledge increasing to 78%. The application of azolla in fresh, dry, or compost form generally improves soil fertility in chemical aspects, including organic C, total N percentage, C/N ratio, organic matter percentage, and cation exchange capacity value (Putra, et al., 2013). Compost fertilizer can maintain soil fertility, and the quality of the compost depends on the main compost material used (Mulyanto, et al., 2023).

Figure 3. Tools and materials needed for making botanical pesticides

Information was obtained that most KWT members are horticultural farmers, especially various types of vegetables planted on land ranging from 250-500 m². Plant cultivation was done conventionally with suboptimal results, even after adding chemical fertilizers. Pests and diseases on vegetable plants are one of the challenges faced. The next activity was the presentation of material on organic cultivation of curly chili. Curly chili was chosen because this commodity had a high economic value. Dependence on chemical (inorganic) substances, both fertilizers and pesticides, has a negative environmental impact, especially on the physical, chemical, and biological properties of the soil, as well as increasing resistance of some major pests and diseases of chili. This is the cause of suboptimal vegetable production. Therefore, an alternative method is needed to restore soil fertility, through organic cultivation that can start from a small scale, such as home gardens.

The results of the questionnaire were also supported by direct Q&A, showing that KWT members were enthusiastic and highly interested in organic chili cultivation with the application of Azolla and botanical pesticides. This was evident in the response during the making of botanical pesticides and the construction of azolla cultivation sites, which increased by 100% (Figure 2). Direct practice activities in the counseling sessions served as a medium to reinforce the knowledge presented at the previous meeting (Saputra, et al., 2021).

The use of tarps and buckets around the house as a base for azolla cultivation was a technology that was easily applied by KWT members. According to Effendi and Ilham (2019), the successful cultivation of *Azolla mycrophylla* in tarp ponds and buckets could reach 80%. A pond for Azolla cultivation as a main ingredient for making Azolla compost fertilizer was created by digging a hole measuring 1.5 x 2 m with a depth of 1 m and lining it with plastic tarp to hold water (Figure 4).

Journal
Pengabdian
Teknologi Tepat Guna
Vol. 5, No. 1, Maret, 2024, pp. 61-69

Figure 4. Preparation of tarps installation for Azolla plant propagation pool

After the presentation of the material, the community service team, along with KWT Handayani members, conducted the cultivation of curly chili plants on the prepared land. There were 192 curly chili seedlings planted on 6 beds, each measuring 8 m^2. The plant maintenance was carried out by KWT members with guidance from the community service team of Politeknik Negeri Lampung.

Figure 5. The condition of chili plants after few weeks planted

Subsequently, plant maintenance activities included fertilization and control of pests and diseases. Organic chili cultivation requires reducing the use of chemicals, especially in maintenance activities. Therefore, other materials are needed that can reduce or even replace the use of chemical pesticides. One of them was used for botanical pesticides by utilizing natural ingredients (Figure 3), therefore the botanical pesticides made at the beginning of the service could be applied at the right time and if availability is insufficient for one planting season, they can be made independently (Figure 3). According to Putri (2021), the use of neem leaves, lemongrass, galangal, and tobacco can control stem borer pests, sucking pests, fungi, bacteria, and nematodes.

The botanical pesticides were made using neem leaves, tobacco, galangal, lemongrass, and klerek (Figure 3). All ingredients were sliced and then crushed using a mortar and pestle. The crushed mixture was then mixed with water, molasses, and brown sugar in a bucket and sealed tightly. After 24 hours, the botanical pesticide was filtered and poured into jerry cans. Botanical pesticides can be applied more frequently than chemical pesticides. The community service team brought the necessary tools and materials for

making the botanical pesticides, which were then donated to the KWT Handayani community and received directly by the chairwoman of KWT Handayani.

The next activity was the production of Azolla Compost Fertilizer with two types of application: fresh and dry azolla. Based on interviews with KWT Handayani members, it was shown that chili production was more durable (not easily spoiled) and the incidence of fruit rot disease on plants was lower compared to the conventional cultivation they often practiced. The recommended harvesting and post-harvest processes for KWT members should use banana leaves because they are safer for organic products.

Acknowledgements

The authors would like to thank Politeknik Negeri Lampung for providing financial support from the DIPA Polinela funds No. 211.31/PL.15.8/PM/2023, which allowed this activity to be carried out successfully.

References

Anwar, H. "Bangka Belitung Surplus Cabai Merah". https://distan.babelprov.go.id/content/bangka-belitung-surplus-cabai-merah. Diakses tanggal 30 Juni 2023.

Effendi, I dan Ilham I. "Teknik Budidaya *Azolla Microphylla* Pada Media Ember dan Kolam Terpal". Journal of Rural and Urban Community Enpowerment vol. 1, no.1 (2019): 67-71.

Hartono. "Penyakit Virus Daun Menguning dan Keriting Pada Cabe Di Yogyakarta dan Upaya Pengendaliannya". Fakultas pertanian Universitas Gajah Mada. Yogyakarta. Makalah Seminar (2003): 6 hal.

Hakim, N., M.Y. Nyakpa, A.M.Lubis, S. G. Nugroho, M. A. Diha, Go Ban Hong, dan H.H. Bailey. "Dasar-Dasar Ilmu Tanah". Universitas Lampung. Lampung. (1986): 488 hlm.

Kartina, R., dan Sismanto. "Dukungan Pestisida Nabati terhadap Kemampuan Pemulihan Tanaman Cabe Organik Demplot IbM Dari Serangan Penyakit Keriting". Prosiding Seminar Nasional Pengembangan Teknologi Pertanian (2016): 113-116.

Mulyanto, Jundi T.K, dan Yohanzen P.B.W. "Pengadaan Sosialisasi Pengembangan Sistem Budidaya Sehat Di Desa Karanglo, Kecamatan Polanharjo, Kabupaten Klaten". Jurnal Pengabdian Teknologi Tepat Guna vol. 4, no. 1 (2023): 48-56.

Ningsih, H. "Pemanfaatan Limbah Kotoran Sapi sebagai Bahan Baku Pupuk Bokashi-Non Kimia sebagai Inovasi Pendukung Pertanian Organik". Jurnal Pengabdian Teknologi Tepat Guna vol. 3, no. 1 (2022): 69-73.

Prasetyo, A., Endang, L., dan Wani, H.U. "Hubungan Sifat Fisik Tanah, Perakaran dan Hasil Ubi Kayu Tahun Kedua pada Alfisol Jatikerto Akibat Pemberian Pupuk Organik dan Anorganik". Jurnal Tanah dan Sumberdaya Lahan vol. 1, no.1 (2014): 27-37.

Putra, D.F. "Pengaruh Pemberian Berbagai Bentuk Azolla dan Pupuk N terhadap Pertumbuhan dan Hasil Tanaman Jagung Manis (*Zea mays* var. saccharata)". Jurnal Produksi Tanaman vol. 1, no. 4 (2013): 353-360.

Prajnanta, F. "Agribisnis cabe hibrida". Penebar swadaya. (2001): 161 hal.

Putri, S.D. "Membuat Pestisida Nabati dengan Bahan di Sekitar Kita". https://pertanian.jogjakota.go.id/detail/index/15067. Diakses tanggal 10 Januari 2024.

Saputra, D.A., Ikhwan, N.A., Muhammad, F.F., Ina M., dan Hayati, M.A. "Potensi Limbah Kelapa Menjadi Pestisida Untuk Meningkatkan Ekonomi dan Keamanan Pangan di Desa Kanoman (Studi Kasus Desa Kanoman, Kec. Panjatan, Kab. Kulonprogo)". Jurnal Pengabdian Teknologi Tepat Guna vol. 2, no. 2 (2021): 8-16.

Santika, A. "Agribisnis cabe". Penebar swadaya. (1999): 183 hal.

Setiawati, W. "Pengendalian Kutu Kebul (*Bemisia tabaci*) pada Tanaman Cabe". Makalah seminar sehari mengenai Pengenalan dan Pengendalian Penyakit Virus pada Tanaman Cabe, Jakarta (2003): 11 hal

Setiawati, M.R., Herdiyantoro, D., Damayanti, M., dan Suryatmana, P. "Analisis C, N, C/N Ratio Tanah dan Hasil Padi yang Diberi Pupuk Organik dan Pupuk Hayati Berbasis Azolla Pada Lahan Sawah Organik. Soilrens vol. 16, no. 2 (2018): 30-36.

Yamada. H. “Some Experimental Result Obtained from the Studies on Technological Evaluasi of Organic Farming and Gardening”. Agriculture Technology vol. 43 (1988): 433-437