

FROM SACRED TO PROFANE: EFFORTS TO CONTROL THE CORN PESTS IN GORONTALO, INDONESIA

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Abstract: Modernisation in corn farming has changed some local practices especially with regard to pest control of the corn plants in Gorontalo. This research aims to explore the correlation between the effectiveness of farming rituals and farming technology in controlling corn pests. The present study employed a qualitative method that relies on primary and secondary data. The primary data was obtained from two types of farmers, traditional farmers and modern farmers, through observation and interview methods. The data was analysed using systematic data reduction, data display, data verification. Data obtained after this three-stage analysis were further analysed using descriptive and content analysis data. The results revealed that the traditional farmers still believe that some farming rituals are still effective in controlling the corn pests. They carry out rituals called *mopo'a huta* (feeding the soil) and *panggoba* (studying astronomical positions that are suitable for starting to plant). On the other hand, modern farmers tend to believe that technology is more effective at controlling corn pests. Using the best seeds, fertilisers and pesticides are easier and will result in higher yields. However, there are some farmers who believe that a combination of both practices produced hybrid knowledge that was the best of both worlds and in line with the integrated pest control techniques.

Keywords: Corn pest, farming technology, farming rituals.

Introduction

Government programmes involving technology-intensive farming has reduced the sacrosanctity of farming rituals. Massive corn production is no longer believed to be determined by traditional farming rituals but by the use of good quality seeds, fertilisers, herbicides and pesticides. The government programme aimed at increasing corn production has carried out massive education programmes and offered assistance packages of seeds, fertilisers and pesticides, has rationalised the traditional farming practices.

The effective use of technology to control corn pests has reduced the farmers' knowledge of traditional farming practices and the local wisdom on farming that had been passed down through generations. Convenient agricultural technology has enabled farmers to extensively farm their land and obtain higher yields than local wisdom-based, traditional farming.

In 2002, the government of Gorontalo province had simultaneously created the Agropolitan programme for corn farming. Since then, corn farming has expanded from only 45,718 ha in 2002 to 72,529 ha in 2003. In only three years' time, the corn farming area has increased by 58.64% and the production of corn has increased from 130,252 tonnes in 2002 to 270,418 tonnes in 2004. Over these years, the corn production in Gorontalo has increased by 92.87% (Mohammad, 2008). The latest data on corn production in the Gorontalo province in 2020 is 643,512 tonnes and the corn farming area stands at 129,131 ha (BPS, 2021).

High corn production is a magnet for other farmers to practice farming with modern technology. Farmers' motivation to implement hybrid varieties of corn also increased (Made *et al.*, 2016). Corn farmers are struggling to adapt to the vagaries of the weather (Ombati, 2021)

and against the various types of corn pests. Sappington *et al.* (2018) noted that there are at least 16 types of corn pests that infect the crop from the soil, the trunk, the leaves and the corn fruit. Advanced technology has been developed and implemented to deal with these corn pests (Li *et al.*, 2021). This requires farmers to adapt and large amounts of working capital. This is one of the complaints that is often mentioned (Biba, 2013). On the other hand, traditional and cheap farming methods are often labour intensive and time-consuming, thus progress are slow (Arjawa, 2021). The application of farming technologies has transformed farming practices. Pest control using insecticides, pesticides and herbicides are easier and more effective than performing farming tasks like weeding to get rid of these issues. This shift in thinking has changed farming practices.

This shift in agricultural practices in the long term is even further away from the integrated pest control programme that was launched by the Indonesian government in 1989 to reduce the use of pesticides (Mariyono, 2008). To date, many farmers believe that pest control is simply spraying chemical pesticides on the crops from time to time (Indiati, 2017).

Integrated pest control techniques that combine biological control techniques with chemical controls (Stern *et al.*, 1959). The optimisation of integrated pest control has shown a reduction in the use of pesticides without endangering agricultural productivity for vegetables (Mariyono *et al.*, 2020) and soybeans (Mariyono, 2007). The practice of corn farming is full of pest control methods that can be done without the use of pesticides. These traditional methods are largely unacceptable as they lack a grounding in common sense and rely on the mystical; however, some of them can and have been proven scientifically.

A previous study has revealed that studies on local wisdom (farming rituals) and the implementation of farming technology to get rid of the corn pests can be classified into three clusters. The first cluster deals with the transformation of farming tools and the shift

away from traditional farming tools (Lestari *et al.*, 2019), (Nurwahyuningsi *et al.*, 2019) and innovation leading to the development of better farming tools (Mulyadi *et al.*, 2007).

The second cluster is related to the efforts to curb corn pests and improve corn production (Sokame *et al.*, 2021) through the use of technology (Sari, 2018; Sappington *et al.*, 2018) such as by developing good quality seeds that are pest and disease-resistant (Li *et al.*, 2021) and using electronics to control pest populations and growth (Mardi *et al.*, 2019) and performing crop rotations to protect corn from root caterpillars (Sappington *et al.*, 2018).

Alternatively, integrated pest control techniques (Mariyono, 2007, 2008; Mariyono *et al.*, 2020). Meanwhile, the third cluster is related to the pest control through traditional means such as how to repel the pests (Yanti *et al.*, 2018) as seen in *tayub* ritual that is practiced by the Javanese farming community (Suharji, 2014), the *Ngayu-ayu* ritual practised by the people of Lombok (Azmiyati & Poernomo, 2019) and the herbicide cleaning by farmers in Kupang (Manafe, 2020), the *Katingka* dry farming practiced by farmers on Muna island (Iswan, 2018) and the *mopo'a huta* ritual used by the farmers in Gorontalo (Hunowu *et al.*, 2020).

This article aims at complementing the previous studies on the effectiveness of the rituals and farming technologies in corn pest control by analysing the effectiveness of these rituals and the implementation of technology in controlling pests. There are three research questions posed in this present study: (1) What is the response of the traditional and modern farmers towards pest infestations? (2) What are the benefits or otherwise of traditional rituals and versus farming technologies in managing pests? (3) How are the efforts to combine these two different practices to manage pests and increase the yield progressing? These questions provide a guideline to understanding the effectiveness of farming technologies at managing pest infestations which has made farmers abandon local farming customs and traditions.

This article is based on the argument that pests are the enemy of the farmers' ability to increase their yields at harvest. Traditional farmers perform the *mopo'a huta* ritual to reconcile with the spirits that bring about the pestilence, whereas the modern farmers apply pesticides. Each of these methods have their own advantages and disadvantages. The combination of these practices will result in maximum yields.

Traditional Wisdom

Traditional wisdom is believed to be the way of life of the rural community, not only to manage the human relations with each other but to find harmony and balance between human beings and nature and even between humans and the spirits. This life-balance and harmony is the most important principle to the traditional farming community (Keraf, 2010). It is important to maintain a harmonious relationship between human beings and the environment considering mankind's livelihood is dependent on nature (Zingraff-Hamed *et al.*, 2021). This harmony will not only ensure present prosperity but future growth as well (Wang *et al.*, 2021). Research points out that local wisdom, contains creativity and the local knowledge of the elites and its society, is a determinant for the harmony between mankind and the universe.

These elements of intelligence, creativity and knowledge sharing among members of the farming community led to the creation of the sacred farming rituals (Suharji, 2014; Iswan, 2018; Yanti *et al.*, 2018; Azmiyati & Poernomo, 2019; Manafe, 2020; Hunowu *et al.*, 2020; Ombati, 2021). The purity of farming as a vocation are shown through the rituals performed by farmers at each stage of the farming process (Harnita *et al.*, 2018). They believe that if the process is not properly carried out, it may result in disasters that can threaten the crops and their yields (Vermander, 2021).

To anticipate and deal with this threat, farmers in Gorontalo regularly perform the *mopo'a huta* ritual as one of the efforts to maintain the balance between human beings and the environment. This ritual consists of

several stages like, *moliladu* (informing the spirits), *moziarah* (visiting the sacred tombs), *motowohu* (creating sounds), *modayango* (dancing until the dancers are possessed by the spirits), *mohumbungo* (singing the requests), *mohantalo* (presenting the offerings), *mohilihu* (repelling the misfortune), *mongadi salawati* (praying and reciting the closing prayers). The core of this ritual is inviting the spirit to enjoy the offerings prepared by the community and the prayers to repel misfortune. Due to this rituals, the community believes that the spirits will not harm the crops through spreading of pestilence (Hunowu *et al.*, 2020).

Meanwhile, the *panggoba* tradition is a ritual aims at looking at the star positions that signify a good season for planting (Tamu & Dako, 2018). The *mopo'a huta* and *panggoba* are series of rituals in traditional farming practices. The obedience toward the taboos within these rituals are the key for the success of the farming activities (Silvi *et al.*, 2017).

Traditional farming rituals are considered complicated and thus, hinder progress (Arjawa, 2021). The complication of implementing this local wisdom is seen in the taboos that should be obeyed, not only by the farmers themselves but also all the members of the farming community. The tight planting season schedules that rely on the positions of the constellations is considered as a hinderance. Meanwhile, in modern farming that relies on technology, planting schedules are based on the availability and readiness of the land and farming tools. The taboos and other obstacles that limit traditional farmers from developing their farming generally do not apply (Syahrana *et al.*, 2014).

Modernisation of Farming

The shift from traditional to modern farming practices is becoming more evident, especially in relation to the implementation of technology in farming. This process was initiated by the introduction of mechanisation into farming practices through the use of harvesting machines, hand tractors and other farming engines.

Farming technology has made farming more efficient, safer and more profitable (Kirkpatrick, 2019) and at the same time has brought about fundamental changes in agricultural processes (Yuliatmoko, 2012) and to the lives and livelihoods of the farmers (Scott, 2000). Implementation of farming technology is considered as a solution to increase the welfare of farmers by increasing their productivity (Mohammad, 2008).

In practice, farmers are required to plant good quality seeds, apply fertilisers, pesticides and herbicides to ensure the best possible growth that would yield the maximum harvest (Emerick, 2018). To support this programme, the Indonesian government provided seeds, fertilisers and production machines to the farmers. This assistance was provided through farmer groups (Dunggio, 2020). Studies in developing countries showed that the low productivity of farmers was due to the low input of modern farming implements. Thus, developing countries are modernizing their farming through a modern input of technology (Cioffo *et al.*, 2016).

The implementation of farming technology in rural areas faces various challenges in many developing countries and these challenges demand policy responses and policy improvements. The implementation of farming technology in Indonesia has been ongoing since 1970 through the intensification of wet rice paddy's farming and the green revolution (Tahir *et al.*, 2019). Cases are emerging on the results of farming technology implementation, not only in economic aspects, but on socio-cultural and ecological aspects.

In terms of the economics, the gap between the rich farmers and farm workers is getting broader (Tjondronegoro, 2013). Meanwhile, from a socio-cultural aspect there is a shift as technology replaces roles of workers (Ratnawati Tahir *et al.*, 2019).

From an ecological standpoint, the environmental destruction due to the excessive use of fertilisers and chemical substances had

degraded the quality of the soil (Suhari, 2014). This unchecked use of farming technology without considering the long-term costs have justified the sacred rituals practiced by traditional farming communities (Peterianus, 2020) and that technology is not the only option for farmers (Lestar, 2018).

Desacralization of Farming

Traditional farming views nature as a creature that should be treated with care and respect (Van Kraalingen, 2019). Therefore, traditional farmers strive to maintain harmony with nature through the various rituals they practice (Hunowu & Pakuna, 2020). A pestilence is considered to be punishment for the neglect of this local wisdom that consider the land as sacred and as the foundation for all beings (Van Kraalingen, 2019).

The complexity of problems faced by farmers in assessing the risks of corn pests was what made it possible for farmers to neglect traditional wisdom and focus on implementing farming technologies (Vermander, 2019). The implementation of technology in corn farming has clearly caused farmers to desacralize farming rituals. The implementation of farming technology has profaned and secularised corn farming.

The increase in corn production due to the implementation of modern farming technologies has lessened the roles of sacred rituals in farming. The *mopo'a huta* ritual is considered as an obstacle to progress and even taken as *shirk* (a sin of idolatry) in Islam (Pakuna *et al.*, 2020).

The sacredness of the *mopo'a huta* ritual is believed to be more complicated than implementing the agricultural technology. The *mopo'a huta* as an effort to create harmony with nature can be achieved when human beings obey a set of prohibitions.

Meanwhile, the *panggoba* tradition which determines a good day to start farming (Tamu & Dako, 2018) is viewed as a hurdle limiting the frequency of planting. Technology is not the only solution to agricultural woes. Certain

farming communities are campaigning for a reversion and a ban on technology in farming (Lestar, 2018).

Farming technology and existence of local wisdom are competing with each other to solve the problems facing farmers while increasing production levels. The correlation between technology effectiveness and farming rituals effectiveness in controlling the pest infestations is the object of this study and has three reasons.

First, implementation of agricultural technology has been getting a wide response, as it enables the farmers to increase their production despite pest infestations. Traditional farming is currently at the crossroads, where on one hand, it is still considered as an effective means of controlling infestations and on the other hand, its practices are seen as inconvenient.

The second argument, it is yet to gain consideration on the analysis of the correlation between the effectiveness of farming rituals and agricultural technology in curbing corn pests. Current studies have pointed out that these two practices are still being implemented, however, there is no literature on how these two different approaches could be combined to produce a hybrid that has all of the benefits and none of the drawbacks.

Third, an analysis on the shifting agricultural practices is becoming important to describe the desecralisation of local wisdom and profanisation or secularisation of farming through government programmes with the aim of increasing production at any cost. These three arguments show that the comprehensive understanding on the relationship between the effectiveness of technology and farming rituals in managing the infestations is a critical and crucial issue to solve as the foundation for the policy of environmentally friendly corn farming management.

Methods

The correlation between the effectiveness of traditional wisdom and agricultural technology in controlling pests was described through

qualitative research that is based on primary and secondary data.

The primary data were farming technology implementation and practiced farming rituals, use of good quality seed and administration of fertilisers by modern farmers and implementation of farming rituals by old farmers. Meanwhile, secondary data consisted of production data and the use of farming tools. Both the primary and secondary data was used as the basis for analysing the correlation between the effectiveness of farming rituals and farming technology pesto combat pest infestations.

This research involves two types of farmers: Traditional farmers represented by old farmers and modern farmers represented by young farmers. These two groups were presented in relation to implementation of traditional farming and technology-based farming. Various beliefs and practices of farmers were identified through interviews. Traditional farmers and modern farmers were identified based on their choice of whether they used traditional or modern farming practices.

Research on the correlation between the effectiveness of farming rituals and farming technologies on its ability to handle pest infestations was carried out through observations and interviews with farmers who use technology in their farming and farmers who practiced traditional rituals in their farming. Next, the data analysis was done on the interviews conducted with these two types of farmers on the effectiveness of farming rituals and the use of technology in corn pest control.

There were three types of data analysis carried out in this study. The first was systematic data reduction, through thematic reduction; the second was a data display as a means to present the research results as a narrative of observation results with excerpts of interviews and third, data verification as a means following the trends in the data obtained.

The data obtained from these three stages of analysis were further analysed using descriptive and content analysis methods. Data descriptions

were used as the foundation for a contextual interpretation. The stages of analysis and methods used in this study enabled this research paper to formulate its conclusions regarding the correlation between the effectiveness of farming technologies and farming rituals in corn-pest control.

Results

Pest infestations have forced the farmers to select the most effective means of controlling these pests. Some farmers have neglected traditional means of controlling these pests considering the rituals to be illogical, complicated and time consuming. They prefer to use farming technology as it was considered a more effective, time saving means of pest control. Others tried a mix of the old and new ways in order to combat the infestations and produce maximum yields at harvest time. These effectiveness of these three methods are discussed below:

Farmers' Responses toward the Corn-pest Invasion

According to traditional farmers who are predominately old farmers, the pests appear by magical, created by spirits. The pests are not naturally born, they are created suddenly and carried by spirits to disturb humans. Therefore, they believe that the issue should be resolved in similar manner (mystically), through rituals to convince the spirits not to affect the crops.

“Based on its massive and sudden appearance of the pests such as caterpillars and rats, they are created by spirits. The massive populations of caterpillars and rats are logically unacceptable. Dozens of caterpillars in a corn tree and tens of rats in a den. These two pests do not attack at the same time, but if they attack at the same time, they just need one night for a field of corn to loss its leaves due caterpillars attack and the rats to cut off all the corn leaving the empty cobs behind.” (AP, AK, Molamahu village, 3 February 2020 & 11 March 2020).

Pest infestations are believed to be the result of human attitudes who have forgotten their heritage. Human beings no longer believe in traditional ideas that believed the pests were brought in by the spirits and therefore, mankind needs to persuade the spirits by feeding them through the ritual of *mopo'a huta* and burning incense to fog the plants. In this way, the spirits will no longer disturb the plants and the plants will be free of pests. In addition, farmers should also observe good days that are appropriate for plantings (*panggoba*) to ensure that the spirits are appeased and the harvests are good.

On the other hand, the use of farming technology has made it easier and faster for farmers to cultivate the land, planting seasons that are traditionally only once to twice a year, have now become three to four times a year, which has disregarded traditional beliefs that there are certain days and months that were unsuitable for planting crops.

“Our ancestors got rid of the rats by simple means that is by rubbing two sticks of white bamboo planted in cross position in the middle of the field. It is believed that the rat's teeth will ache when it tries to eat the corn, just like our teeth ache when we hear the rubbing sound of the bamboo. Pest infestations are also caused by a mistake in determining the day and hour to plant. Based on traditional knowledge, the day and hour to plant is pre-determined, for instance, today, the best day to plant is between 10.00 am to 12.00 pm, planting at other than these times, the result will be fatal.” (UN, KS, Molamahu Village, 7 & 10 December 2019).

Modern farmers, who are predominately young farmers, believe pestilence is natural, as human beings are natural created by God, born, grow and develop naturally.

“The pest appears naturally due to our mistakes in treating the land and the plants. The pests grow and develop just

like us human beings, unlike Adam who was created directly as a mature man. Therefore, the way to control the pests should be rational and real. Relying on rituals in getting rid of the pests is no longer effective. It is different from the past, the rituals were sacredly carried out and the impact was evident. Today, it is no longer sacred, thus, it has no effect. Therefore, I feel more secure using pesticide [than traditional rituals] by observing its user's guide." (RH, SM, Molamahu village, 22-23 December 2019).

"I use fertilisers, good quality seeds and pesticides to get healthy and fertile corn, however, the pests are stubborn. I have experienced several harvest failures. The caterpillars and fungus infections can be solved by spraying with fungicide and insecticide. The most difficult one to deal with is the rat infestation. The common mistakes made by farmers in controlling the infections is ineffective spraying, this happens when the newly sprayed field is washed out by rain and no repeated spraying treatment is administered." (ZB, TS, Molamahu village, 11 December 2019).

"Corn farming should be done by following the instructions. Even more when using the organic fertilisers available in the market. It needs rigors and tenacity and patience or else the result will be disappointing; for instance, when instructed to spray three times and just because we are lazy, we only spray twice and then got infected with the pest." (IJ, JH, Molamahu Village, 12 & 14 November 2019).

Table 1 shows different responses of the farmers to the pests. This study reveals that both groups of farmers have different responses to managing infestations based on their beliefs. The older farmers employ traditional means

of pest control, while the young farmers use modern ways.

Both groups have the same objectives to get rid of pests and ensure a good harvest. Each group is competing against the other a question the excessive and or illogical ways of the other group; each group is also keenly aware of the advantages of their selected means of pest control. In the end, the ultimate objective is to increase yields and improve their prosperity.

The Advantages and Disadvantages of Traditional and Modern Farming

Each group claims that their means to control the pest is the most effective way. Based on the farmers' statement in this study, modern and traditional farming each have their own advantages and disadvantages. These are evident in the excerpts of interview presented below.

"In my observation, traditional knowledge and modern knowledge each has its own advantages and disadvantages. The way to treat the pest using traditional means seem very simple and often hard to rationalise. However, the results are evident. Several years ago, I compared two nearby fields, one was attacked by pests, the other one was not. It turned out that the owner of the land that was not infested used traditional knowledge." (MM, BB, Molamahu village, 21 & 24 February 2020).

"In the past, the pests were rarely seen, even so, there were only a few, but now, the number are enormous and even hard to believe. It is because people believe more and more in technology. In fact, pests are made by spirits, therefore, to manage it, we have to persuade those spirits through the *mopo'a huta* ritual. [We] have to provide them with offerings that they like. Hence, there will be no creature offended and the plants will be saved from the pestilence. Using the spray, we

Table 1: Farmers’ response against the corn pest

	Belief	Action
Traditional farmers	Pests are created by God	Perform the <i>mopo’a huta</i> rituals to make peace with the spirits
	Pests are still God’s creatures	Evicted/controlled by <i>molapo</i> ritual and rubbing two white bamboo sticks
	Good day and bad day	Planting the corn during good months/days/hours
Modern farmers	Pests infected the plants	Use good quality seeds, fertilisers and spray the plants with pesticides to prevent pests
	Pests are farmers’ enemy	Destroyed/controlled by implementing the technology (good quality seeds, fertilisers, pesticides)
	All day is a good day	Planting the corn when the field is ready

may kill hundreds and even thousands of souls, after that, even more pests will come [to destroy the plant]. It is because many farmers no longer believe in supernatural beings, [they] rely heavily on technology; thus, the supernatural beings show their power.” (AP, Molamahu Village, 9 November 2020).

“I think it is illogical to destroy pest with rituals. The logical way for me is by spraying them. Caterpillars are destroyed by spraying them with poison, thus, they die, whereas rituals, we must prepare many things, it is hard and tiring and the result is yet to be proven. [Just] like now, we have already performed the *mopo’a huta* ritual, but the pests keep coming.” (IJ, JH, Molamahu village, 12 & 14 November 2019).

“I do not want to be bothered with the old ways. The current technology is so advanced that if we follow the user’s guide; I destroy the pests with pesticide and the result are real. Once I spray them, the caterpillars and the grasshoppers die. But we must admit that the infestation is increasing

and they are now varied. Therefore, I prepare the proper pesticides, herbicides, insecticides that are suitable and when there are signs that my plants are infested, then I administer those pesticides. Alhamdulillah, the result is satisfactory.” (RH, SM, Molamahu village, 22-23 December 2019).

“Not all the plant pests can be managed with technology. For instance, the rats and the downy mildew. Administration of rodenticide is not effective when the rodents’ attack the damage is massive. Meanwhile, downy mildew can be treated by pulling out the invaded corn to prevent it from attacking other corn plants. There is also an extreme way to solve this pest, it is highly effective but can be dangerous to human beings, which is by asking the assistance of five spirits that protect the plants, the plant will not be invaded by pests, but it can harm human beings that touch the plant. The human beings that accidentally touch the plant will have dysentery.” (IJ, JH, BD Molamahu village, 12 & 14 November 2019).

“I administered herbicide each planting seasons and I see that the soil is getting

arid, if I do not administer fertilizer, the yield will not be good. If the rain does not come for several days, I can see the cracks in the soil; maybe due to poison. It was not like this in the past, before, the soil was fertile and each season, the weeds are cleared by cutting them and when they are dried, we burn them. The residue from the burning will become natural fertilizer; now, we use chemical fertilisers as it is most practiced; we can do nothing.” (SM, Molamahu village, 23 September 2020).

Table 2 portrays the comparison of traditional and modern means in solving the plants' pests. This present study shows that traditional and modern means have their own benefits and downsides. The effectiveness of the traditional and modern farming technology differs in certain aspects. The traditional means' effectiveness lies in communal obedience, whereas the effectiveness of agricultural technology relies on individual obedience in administering the cure and observing the proper instructions in the user guide.

Communal obedience applied for all the community members to observe the taboos during the administration of the traditional rituals, such as, forbidden to enter the forest during the ritual and forbidden to go out of their homes and forbidden to create loud sounds for three days after the ritual is performed. It is also forbidden to touch the plants who are protected by the spirits. Communal obedience toward these

taboos will result in the plants not being infected with pests. The effectiveness of the *mopo'a huta* ritual can last for between one and five years. Meanwhile, the modern farming means of pest control must be administered each season. Many people today remember the effectiveness of the *mopo'a huta* ritual, especially the older generation who had once applied these extreme methods.

Meanwhile, individual obedience in implementing the technology needs a certain degree of knowledge, as some farmers believe that the more frequently the chemicals are administered, the more effective it will be. This has often caused the soil to lose its nutrition and gets rid of the natural enemies of the pests (Sokame *et al.*, 2021) thus, the pests are becoming more varied and numerous.

Efforts to Combine Both Traditional and Modern Knowledge to Corn Plant Pest Controls

Pest control should always be administered by farmers, irrespective of whether they use modern or traditional farming methods. Both farmers' groups have shown mixed results in managing the corn pests. The result of the study presented in Table 2 points out several disadvantages of traditional farming that have become the advantages of the modern farming and vice-versa.

This has led to the combination of both methods as a means to complement each other in an effort to retain all the advantages and reduce

Table 2: Comparison of traditional and modern ways in treating the plant pests

Traditional Farming	Modern Farming
Environmentally friendly (humanist)/extreme (can be harmful to human)	Environmentally destructive (toward soil and the biological enemy), poisoning for human
<i>mopo'a huta</i> ritual is communally performed	The spraying is individually administered
Many things (offerings) are prepared and available in nature	Not many things to be prepared and most of things should be bought
The effect is slow but last annually	The effect is quick and can be done anytime
Practiced by a few	Practiced by many
Difficult and tiring	Easy and effective

or eliminate the disadvantages. In addition to using modern farming technology, they also pay attention to the simple, proven local wisdom such as mores on selecting a good time to plant.

“Based on my observation, the pests can be taken care of in two ways, first, using the ancestors’ knowledge and heritage for instance, trying to avoid forbidden days to plant. I often must postpone several days to wait for the good day to plant. Then, if the pest persists, then there is no other way but to spray pesticide, Alhamdulillah my harvest is abundant.” (UN, KS, Molamahu village, 7 & 10 December 2019).

“It has been several harvests that my corn has been successfully harvested without any significant pest control issues. I try to combine the instructions of the old generation for pest control, such as, selecting the good days to plant and fogging the plants when the corn show their red hairs. About the seeds, I use good quality seeds as local seeds are no longer available. I also use chemical sprays that sold in the market.” (BB, Molamahu village, 24 February 2020).

“I use traditional ways to get rid of the plants’ pests, either by using magics and using certain tools, like the white bamboo to control the caterpillars, but many are no longer functional; hence, I also practice modern ways. This way is better than letting my corn get destroyed by the pests. Alhamdulillah, the result is satisfactory.” (AK, Molamahu village, 11 March 2020).

The results of the study indicate that the performance of rituals such as *mopo’a huta* are facing many challenges from religious groups. On the other hand, the use of technology in the war against pests does not legitimately mean that the modern way is the most effective. The result of this study proves that there has been

a desacralisation of corn farming rituals. The research shows that an integrated implementation of traditional wisdom and modern knowledge (hybrid knowledge) can minimise the possibility of pest infestations on the crops.

The application of this hybrid knowledge is in line with the concept of integrated pest control (Stern *et al.*, 1959). Further, the administration of traditional ways, such as rubbing white reeds and burning incense in the garden (*molapo*) are two traditional methods that can be scientifically proven. First, rubbing the two reed blades made a creaking sound that causes discomfort. Research conducted by Reuter (2011) found that creaking sounds such as nails rubbing against a blackboard can cause a physical reaction, which is the significant change in the conductivity of the skin will make a person feel uncomfortable (Reuter, 2011). This reaction is thought to create discomfort in rats and caterpillars when they hear the creaking sound of the white reed scraping.

Second, burning incense around the gardens to ward off vermin that spreads pests has produced smoke that hits the corn plants. This condition scientifically can stimulate shoot growth and can control wilt disease as found by Nuryani *et al.* (2016). Fumigation can also suppress pest populations (Hadi, 2021). This scientific evidence proves traditional methods are a rational, viable choice for pest control.

Discussion

This present study points out that farmers’ action in controlling the plants pests has become a significant factor that in determining the rational or spiritual ways in controlling the pests. Rational farmers rely heavily on appropriate technology implementation by employing good quality and pests’ resistant seeds or spraying the chemical substances to get rid of the pests.

Meanwhile, traditional farmers opt to use spiritual approach by performing certain rituals, either communal ritual (*mopo’a huta*) or individual rituals (rubbing white reeds, *molapo* and *panggoba*). In addition, there are also

other farmers' groups who try to combine these rational and traditional approach to produce a hybrid knowledge for corn farming.

This knowledge is in line with integrated pest control techniques. The small number of farmers who practiced the *mopo'a huta* ritual is an indication of the strengthening of modern farming methods and technologies.

The strengthening of farmers belief on implementation of farming technology reflects a shift in a previously sacred corn farming practices to profanisation or secularisation of corn farming. This implementation of farming technology in corn farming in the long term will cause much harm not only ecologically but also to human beings.

Therefore, the application of farming technology is not the only way to control corn pests. To certain extent, traditional wisdom has its advantages. The harmony with nature principle within the perspective of local wisdom; getting rid of the pests spiritually against the implementation of technology that consider pests the enemy that should be tempered with logic and care.

Scientifically, there are natural enemies/bio-enemies of the pests in agriculture (Sokame *et al.*, 2021). The pest's infestations begin naturally due to the extinction of its bio-enemy. The extinction of natural enemy may be due to the excessive usage of chemical substances administered to the soil and plants. The more often a new pest is destroyed, the more frequently new types of pests emerge. This condition is considered as a failure of technology as a pest control and therefore, local wisdom is viewed as an appropriate way to manage the issue.

Nevertheless, when this traditional means is administered and the pests keep coming, then traditional ways may be considered to be ineffective. At the end, such facts conditioned farmers to choose to use technology for pest control.

Corn productivity is influenced by biotic and abiotic things that reduced the quantity and quality of the yield. Pest is one of the main

threats for maximum corn production (Sokame *et al.*, 2021). This condition requires farmers to act together in to control the corn pests either traditionally or using technologically, which shows that pests are the common enemy of the farmers. They try in their own ways to protect crops from the pests.

The enemy of traditional farmers should not only be destroyed but controlled. For traditional farmers, pests should be naturally controlled using natural ways through certain rituals, thus the controls are not through killing or destroying the pests. Meanwhile, modern farmers, view pests as the enemy that should be destroyed by administering poisonous chemical substances to ensure quick and effective death.

The two approaches are taken by the farmers in order for their corn to grow healthy and produce high yields.

The shift from the previously sacred corn farming to a "profane" farming are yet to find which of these approaches is more superior than other, however, the preference for modern farming methods is becoming ever evident. The efforts to combine these two approaches have created hybrid knowledge that are started to be practiced by farmers who are overwhelmed by pests despite using modern controls. The combination of these two approaches is in line with integrated pest control techniques.

Conclusion

The Indonesian government's target of increasing corn production (Thomas, 2019) has made it possible for farmers to wage a war on corn pests. This condition has economic benefits for many parties, however, ecologically it is not only destructive but can cause long-term harm to human beings who consume the corn (Thomas, 2019).

Traditional farming methods that hold the principle of finding harmony with nature as a means of pest control without killing the pests are starting to lose practitioners, even though such methods can be scientifically proven. Farmers are now more inclined to use poisonous

chemical substances to get rid of corn pests. This also kills the natural enemies of the pests, leading to an increase in the number, frequency and types of pest infestations that are becoming harder to control.

Over time, the administration of pesticide has made the corn pests become resistant to those chemical substances. Increases in pest populations are influenced by the administering of pest controls (Zhang *et al.*, 2019). The increase of pest invasion in the plants is traditionally believed as the manifestation of the nature's anger (the spirits), sporadically spreading the pests. Farmers believe that the advantage of these two approaches has developed a hybrid knowledge, an alternative that supports integrated pest control techniques. This alternative also must have the full support of the government.

This present study is limited to the modern and traditional means of controlling corn pests. It has yet to consider the impact of the utilisation of farming technology on humanity.

Thus, it is recommended for a further study is done to see other aspects of farming profanisation on health by practicing environmentally responsible farming (Wieren, 2017).

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