

PROCEEDING

International Conference on Science Technology and Engineering
For Sustainable Development
(ICoSTES) 2018

*“Towards Enhancement of Agriculture and Animal Husbandry Natural
Resources and the Environment and Engineering in the ASEAN”*

Malang, September 10-11th 2018



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FOREWARD



Dr. Ir. Nurhidayati, MP.

Chairman of organizing Committee
ICoSTES 2018

Assalamu'alaikum warohmatullahi wabarokatuh

Good morning ladies and gentlemen,

First of all, grateful to Almighty God, for the grace given to us and a fruitful opportunity to meet in the First International Conference on Science, Technology and Engineering for Sustainable Development (ICoSTES 2018).

On behalf of the ICoSTES committee, a warm welcome to dignities on the desk, speakers and participants come from different countries and to say "Hello".

I wish to take this opportunity to welcome the keynote speaker Prof. Inocencio Jr.E. Buot from UPLB, Philippine, Prof. Wu Jiunn-Chi from NCU, Taiwan, Prof. Thanda Aye from Yangon University, Myanmar, Assoc.Prof. Rawshan Ara Begum from Kumamoto University, Japan, Assoc.Prof. Pramote Paengkoum from Suranaree University, Thailand, Prof.Sutiman from Brawijaya University, Indonesia and Prof. Agus Sugianto, from University of Islam Malang, Indonesia.

Indonesia is one of the fastest growing and developing country, rich and diverse in plant and animal, natural resources and the physical environment. Presently, there is a need to nurture these diverse landscapes and resources interdisciplinary by collaboration with professionals in the fields of natural sciences, engineering, social sciences, humanities and the arts and using sciences and engineering, developed a sustainable technology.

In this light, we initiate this international conference, ICoSTES 2018 in the University of Islam Malang (UNISMA).

ICoSTES will advocate an interdisciplinary platform, will be held every alternate year in the month of September. This year we will have the theme, Towards Enhancement of Agriculture and Animal Husbandry, Natural Resources, and the Environment and Engineering in the ASEAN” The objectives are as follows: (1) organize ASEAN professionals to share studies in agriculture and animal husbandry, natural resources, and the environment and engineering, (2) identify the gaps in the study of agriculture and animal husbandry, natural resources, and the environment and engineering in the region, and (3) collaboratively craft strategies in addressing the gaps for a sustainable agriculture and livestock, natural resources and green environment technology.

Through this conference, we will have opportunity to listen to the experts, researchers, and practitioners in addressing the sustainable development especially in developing countries. I am confident that the discussions held during the conference will lead us at the end to important technical conclusions on this subject.

Finally, I am grateful to all universities and sponsors who supported this conference. My thanks also go to the Prof. Inocencio Jr.E.Buot (UPLB, Philippine) and also Dr. Merites Buot for taking a part in the preparation and conducting conference and to various parties who have helped the success of this conference. I hope the seminar can serve as a window through which can learn from world advanced knowledge in terms of sustainable development in era of Industry Revolution 4.0.

Please be happy and enjoy your stay in our education and flower city, Malang, Indonesia.
Thank you

Wassalamu’alikum Wr.Wb.

SPEECH OF RECTOR



Prof. Dr. H. Maskuri, MSi.

Rector

University of Islam Malang,
Malang, East Java, Indonesia

Assalamu'alaikum warohmatullahi wabarokatuh

Good morning Ladies and gentlemen

Honorable keynote speakers, oral and poster presenters and all of participants.

Distinguished guests, ladies and gentlemen.

At this precious moment, let us first express our gratitude to the Merciful God who has granted us with blessings and grace that we could gather here today to attend the First International Conference on Science, Technology and Engineering for Sustainable Development (ICoSTES 2018). Let me extend my warmest greetings and welcome to our distinguished speakers and participants, particularly those from abroad, my heartfelt welcome to our beloved city, Malang. I would like to express my appreciation to each of you for having attending this international conference.

As some of us may probably know, there has been cooperation between University of Philippine Open University, Los Banos, Laguna, Philippine and the University of Islam Malang (UNISMA), East Java in the committee of the conference. UNISMA also had cooperation with several universities in ASEAN including Prince of Songkla University, Thailand, Silpakorn University, Thailand, Universiti Putra Malaysia, University Malaysia Kelantan etc. In this occasion, the University of Islam Malang wants to cooperate with institutions of the other keynote speakers from National Central University (NCU), Taiwan, Yangon University, Myanmar, Suranaree University of Technology, Thailand, and Kumamoto University, Japan. Furthermore,

we certainly expect more programs to come in the near future as the continuation mutual cooperation.

Distinguished Guest, Ladies and Gentlemen,

In this era of globalization, where there have been rapid changes in environment and climate conditions with various implication as a result of the global activities of technology, we really need to be prepared to meet the challenges driven by the global demands. As we know in the developing countries such as ASEAN, climate change has caused changes in environmental conditions that have an impact on various sectors of human life including biodiversity, agriculture, livestock and engineering. There is a need to nurture these diverse landscapes and resources to sustain our mega diversity status. Incidentally, nurturing these rich resources needs an urgent interdisciplinary and transdisciplinary collaboration among ASEAN professionals in the fields of natural sciences, engineering, social sciences, humanities and the arts. It is in this light that we have to initiate this international conference. This conference is an opportune time to discuss problem of mutual interest with delegates from some countries. It is gratifying to note that the agenda of the conference covering a wide range of very interesting items related to natural resources, environment and engineering.

Distinguished Guest, Ladies and Gentlemen,

On behalf of Rector-University of Islam Malang, East Java, I would like to express my gratefulness to some abroad Universities for the support given to the committee, especially Prof. Inocencio. Jr. E. Buot from UPLB for the support given to the committee. My appreciation also goes to the steering and organizing committee who have made this program possible. May congratulate the committee for success of conducting this international conference.

Finally, I wish all the participants success in a productive discussion throughout the conference and a very pleasant stay in our beautiful city of Malang. Thank you.

Wassalamu'alikum Wr.Wb.

CONFERENCE SCHEDULE

Sunday, September 9th 2018 : Check-in and Registration

During the day Arrival of Participants, Transportation to the Hotel and Check in
4:00 p.m. – 6:00 p.m. Conference Registration

Monday, September 10th 2018: Conference Day 1

7:00 a.m. – 8:30 a.m.	Conference Registration
8:30 a.m. – 9:30 a.m.	Dance Performance Opening Ceremony
9:30 a.m. – 9:45 a.m.	Coffee Break
9:45 a.m. – 12:00 a.m.	Plenary Session Keynote Speaker : 1. Prof. Inocencio E.Jr.Buot Jr. ,Ph.D University of the Philippines, Los Banos, Philippines. 2. Prof. Wu, Jiunn-Chi, Ph.D National Central University, Taiwan 3. Prof. Sutiman B. Sumitro Brawijaya University, Indonesia
12:00 a.m. – 1:00 a.m.	Lunch Break and exhibition session (Sponsorship), Poster Session and Praying for Muslim
1:00 a.m. – 3:00 p.m.	Parallel Sessions I
3:00 p.m. – 3:30 p.m.	Coffee Break and Praying for Muslim
3:30 p.m. – 5:20 p.m.	Parallel Session II
6:30 p.m. – 8:30 p.m.	Welcome Dinner (for foreign Participants)

Tuesday, September 11th 2018: Conference Day 2

7:00 am – 8:00 am	Conference Registration
8:00 a.m. – 9:30 a.m.	Plenary Sessions I Invited Speakers: 1. Prof. Thanda Aye, Ph.D. Yangon University, Myanmar 2. Assoc.Prof. Pramote Paengkoum, Ph.D Suranaree University of Technology, Thailand
9:30 a.m. – 9:45 a.m.	Coffee Break
9:45 a.m. – 11:45 a.m	Plenary Sessions II 1. Assoc. Prof.Dr. Rawshan Ara Begum, Ph.D Kumamoto University, Japan 2. Prof. Dr. Ir. Agus Sugianto, ST., MP. University of Islam Malang, Indonesia
11:45 p.m. – 12:30 a.m.	Lunch Break, exhibition session (Sponsorship), Poster Session and Praying for Muslim
12:30 a.m. – 3:00 p.m.	Parallel Sessions I
3:00 p.m – 3:30 p.m.	Coffee Break and Praying For Muslim
3:30 p.m. – 4:00 p.m	Parallel Sessions I
4.00 p.m – 4.30 p.m	Closing Ceremony

Thursday, September 12th 2018: Post-Conference Excursion (Optional)

KEYNOTE SPEECH



Innocencio E Buot Jr, PhD

(Professor, University of the Philippines Los Banos, Philippines)

Abstract

Biodiversity in the ASEAN: Status, Challenges and Opportunities for Scientists and Universities

ASEAN is a unique region, both geographically and biologically. With the recent ASEAN Integration, an enabling environment for cooperation and collaboration in teaching and research has been enhanced. ASEAN has abundant natural resources in the Sundaland, Coral Triangle and Wallacea, among others. These natural monuments enhance marine, freshwater and terrestrial biodiversity. The Sundaic biogeographic region includes the Malay Peninsula, Borneo, Java, Sumatra and the islands in the vicinities. The flora and fauna of the region is distinctly Asiatic in nature. Its easternmost border is the Wallace Line, which is between Bali and Lombok. The islands east of the Wallace Line, known as Wallacea are characterized by a biodiversity totally different from the western side of the Wallace Line. The eastern block have floristic and faunistic elements more related to Australasia than Asia. The Coral Triangle includes the marine waters of Indonesia, Malaysia, the Philippines, Papua New Guinea, Timor Leste and Solomon Islands. It is home to a very rich diversity of corals, turtles, fishes and a variety of marine life supporting a huge number of human populations in the region. Three (3) of the seventeen (17) megadiversity countries of the world are ASEAN members: Malaysia, Philippines and Indonesia. These are countries with high number of unique species in a very limited piece of land. However, ASEAN, with the exception of Singapore and Brunei, are included in the list of twenty-five biodiversity hotspots in the world, which refer to countries with rapid loss of biodiversity due to anthropogenic activities like deforestation, shifting cultivation, land conversion, and over-harvesting.

There is a need for ASEAN to have a concerted effort as a region, in addressing natural resource management problems. University researchers and scientists in the ASEAN can dynamically work as one region towards this end. This can minimize sustained loss of biodiversity which could be possible sources of food and medicine. The megadiversity of ASEAN, incidentally, is not much studied yet. It is ironic for a mega-diverse nation, to have high rates of poverty among its populations (like the Philippines). Exploring more food and medicine sources from the wilderness should be a wise move. This can jointly be done as an ASEAN endeavor.

Keywords: Sundaland, Coral Triangle, Wallacea, megadiversity, biodiversity hotspot, natural resource management, poverty



Jiunn-Chi Wu. PhD

(Associate Professor, National Central University, Taiwan)

Abstract

Application of clean energy with examples of solar energy

The energy sector has always been profoundly shaped by technological innovation, building on new discoveries to facilitate everyday life and provide access to new services. The focus of this talk is examining the progress of clean energy and discussing examples of solar energy.

The first part of the presentation is based on the report published by the International Energy Agency (IEA). The report *Tracking Clean Energy Progress 2017* provides an overall sense of the state of global progress for each energy technology. It analyses various energy sector development paths to 2060, each with different implications for the development and deployment of energy technologies and for energy policy.

Next, my presentation will focus examples of solar energy. The solar energy has features with abundance of resource and thus have many applications from simple one such as solar cooker to advanced concentrated solar energy. Three types of concentrated solar energy will be discussed. The concentrated photovoltaics (CPV) has highest solar cell conversion ratio and works for high insolation. The concentrated solar power (CSP) which based on solar thermal conversion process for electricity generation has potential for constructing large solar power plant. Another application of concentrated solar energy is for solar lighting where solar radiation is concentrated and guided via optical fiber for better illumination.



Sutiman Bambang Sumitro, M.Sc., D.Sc

(Professor, Brawijaya University, Indonesia)

Abstract

Biology as Inspiration in settling Community Problems

Towards the twenty-first century, many people felt that Biological research had brought Biology to new ideas and references in many fields outside Biology. Aside being an inspiration, biological principals are also applied for other things related to times and impact of civilization. The phenomenon of life that was only limited on the studies of the Biology discipline, is currently applied and developed as the most reasonable way of thinking to every effort of problem solving. This role is not only limited to the fields of natural sciences or engineering but also extends to social science studies. Preparing for the 21st century research policy, the United States government created a 'Committee on a New Biology for the 21st Century, the New Biology Initiative'. The committee produced policy and guidance in science development to settle community problems at 21st century. The guide was essentially a development integration of interdisciplinary thinking with the laws of Biology as the main reference. New Biology is not Biology but a transdisciplinary science or thinking that uses the principles of Biology.

New Biology is directed to solve social problems related to health, food, energy, and the environment. For example, disease these days that has shifted from an infectious disease to a degenerative disease due to changes in human behavior and everything related to the impact of human activity. This degenerative disease is far more complex than infectious diseases. This type of disease involves the entire body system, and changes the physiology system into pathophysiology in form of metabolic syndrome also cell and tissue behavior that is unclear and disorganized. The phenomenon can no longer be thought with simple causal rules. For example, diabetes type two, people all over the world comprehensively try to analyze by using structural relation principles and function in evolutionary process. Many people begin to accept the explanation that humans are basically physiologically designed creatures adapted to the limitations of food sources. Humans in the past learned that food must be struggled through bodybuilding in the form of hunting or climbing trees. Nowadays humans change as ruminants, at this time it is very easy to get food without much effort. The body shape and having canines that exist in human body are closer to the structure of prey hunter mammals. Body shapes such as lions and tigers have a larger portion of their stomachs. While many humans these days tend to have a stomach size bigger than the chest, similar to ruminants such as buffalo, cattle or horses. Patients with diabetes type 2 are people with obesity along with the characteristics of abdomen larger than the chest, this posture is more similar to grass-eating animals and

ruminants above. The availability of abundant grass makes this type of animal does not have to struggle to get food. Similar to humans today. This is where diabetes is seen as part of evolutionary change and tends to be untreatable. Even the act of controlling sugar levels has begun to be considered as inappropriate.

Besides, among scientists, Biology itself began to build new concepts that are more interesting and understandable by non-Biology scientists. Evolution, for example, is not merely seen as a struggle for existence, competition or survival of the fittest. Evolution begins to be interpreted differently with the aim of generating ideas that are wiser. Many Biologists give the notion of evolution as a “cooperative dance” by interpreting “competition of the fittest” as novelty creativity, as a driving force to change towards higher quality. In the world of business or other social creativity, knowledge or new things that are oriented towards improving the quality of systems and goods, slowly emerge from time to time as a result of the complex interaction and interconnection, of nonlinear phenomena in an organizational pattern. Nowadays, many parties realize that the dynamics in society are not a force competition show, but competing to organize themselves (doing cooperative dance) to meet the demands of time change. In the business world, the concept is known as ‘lean start up’. Technological development, organization, product quality must be spry to follow market changes, users or customers if they do not want to be eliminated and die.

New Biology also allows to examine the phenomenon of life by utilizing the concept of Modern Physics. The idea was first proposed by Firtjof Capra, who defined the process of life as ‘The ceaseless flow of energy and matter through a network of chemical reactions, which enables a living organism to generate, repair, and perpetuate itself.’ The definition of this life process may apply to the application of Modern Physics principles that related to the flow of energy and thermodynamics principles. Thus, the concepts of photosynthesis, electron transfer activity in Krebs cycle can become the inspiration of many parties to make an efficient energy transfer system. In the health sector, it has begun to emerge the concept of free radical management in the form of electron flow in cellular metabolic system, as controlling inflammation in sufferers of any illness as a therapeutic mechanism.

Conclusion: Biology has now turned into New Biology, a realm of interdisciplinary scientific thinking that is no longer part of the monopoly of biologists. Researchers, teachers and biologists must be aware of this new concept if they don’t want to be left behind. The implementation of teaching and education of various cases of scientific development which are often considered as Biology fields such as Molecular Biology, Genetic Engineering, and Environmental Impact Analysis, is no longer the dominance of Biology study programs or Biological education. New study programs appear related to changes in community needs that are taught by faculties or departments that are no longer nuanced by Life Sciences. Many of the lecturers are from various backgrounds such as from Chemistry, Social Sciences and others even Modern Physics.

The examples above illustrate changes in science in the 21st century. Science is no longer enough to be discussed monodisciplinary but must be cross-disciplined and integrated to provide new ideas that are not partial and less effective. Hopefully this picture can inspire ladies and gentlemen as Biology educators and instructors. Education specialist of Biology teachers or lecturers must be able to open an access and receive knowledge from other fields. Even Biology must be an inspiration for those who are engaged in social sciences and policy makers so that they can use the principals of Biology. Biological approach that is analytic-reductionist, must be reprocessed with the Complexity Science approach and also Nano Science which is a material science based on Modern Physics.



Thanda Aye, Ph.D.

(Professor, Yangon University, Myanmar)

Abstract

Varieties of Myanmar Mangoes and Off-season Fruit Production of *Mangifera indica* L. cv. Sein ta lone

Mango, *Mangifera indica* L., belongs to the family Anacardiaceae. Of the total 62 species, about 16 are edible and cultivated commercially, while the remaining are either wild species or are non-edible. Mango originated from the Indo-Burma region, northeast India, and northern Burma, and in the foothills of the Himalayas. In 2016, Myanmar Agriculture Department reported that Myanmar has 198 varieties of mango grown in the whole country. Growing of mango required the soil drenching of paclobutrazol and then spraying of KNO_3 . Upon evaluation the dose of PBZ, 4g PBZ treated trees gave the optimum fruit quality. Among spraying 3% KNO_3 treated trees resulted the optimum fruit quality. Their interaction treatment also showed that 4g PBZ+ 3% KNO_3 were the best. Therefore, PBZ and KNO_3 had effect on flowering, fruiting and fruit quality. The total cost for per acre Seintalone mango fruit production in off-season gave 8% of net profit.

Keywords: off-season, PBZ and KNO_3 , net profit



Pramote Paengkoum, Ph.D

(Associate Professor, Suranaree University of Technology, Thailand)

Abstract

Sustainable Animal Production in the Tropics

In most tropical countries, productivity-increasing technological change in animal production/ agriculture is necessary for solving chronic problems of hunger and malnutrition. Food production results from the relationship of human, animal, land, water and capital resources. In many farming systems of the tropical countries animals have an integral role and the full range of animal products are utilized. Within the former are food-feed intercropping, relay cropping, forage system, integrated animal-fish-crops systems and systems combining crops and animals. Many of these outputs are also important farm inputs, such as, manure and draught power. Animals also provide a strategic source of cash which can be called on as required to purchase other essential farm inputs and food during the critical periods of the year, thus helping to alleviate poverty and increase household food security. With an increasing world population, food production cannot be allowed to stagnate, clearly, there is a need for more sustainable increases in animal production/agricultural output. The complementarity between crops and livestock, which allows for nutrient recycling, energy and value added production is unique and needs fully exploiting. The challenging task is that of linking sustainability to agricultural growth and the alleviation of poverty. For animal production, the challenges and expectations will be even greater, in view of concerns about their current contribution. An increased contribution from animals in the future needs to be identified with their ecological and socio-economic impact.

Keywords: Animal, sustainable, integrate, tropics countries



Dr. Rawshan Ara Begum, Ph.D

(Associate Professor, Kumamoto University, Japan)

Abstract

Climate Change Mitigation & Adaptation: Global to ASEAN & Malaysian Perspective (Special Focus on Agricultural Productivity)

According to IPCC's (Intergovernmental Panel on Climate Change) fifth assessment report (2013), climate change is unequivocal and many of the observed changes are unprecedented. More than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in greenhouse gas (GHG) concentrations (extremely likely). Continued emissions of GHGs would cause further warming, climate change and its consequences. However, in 2010, AFOLU (agriculture, forestry and other land use) sectors contributed 24% of global anthropogenic emissions whereas Southeast Asia (Indonesia, Malaysia, Philippines, Thailand & Vietnam) is also experiencing a high rate of GHG emissions from land use and agriculture sectors (55%). Nevertheless, the impacts of climate change are affecting agricultural and terrestrial food production, nutrition and food security, as well as enormous property and livelihood damages, economic growth and human development that pose a serious threat to the nation and community. Consequently, climate change becomes a major concern of the developing countries including Malaysia. Responses via mitigation, adaptation and policy measures are crucial to reduce the global GHG emissions and the negative impacts of climate change. Therefore, this presentation provides an insight of climate change issues such as GHG emissions; vulnerability; adaptation; mitigation (especially in agricultural productivity and food security); and economic & policy approach from the perspective of global to regional and Malaysia.



Dr. Ir. Agus Sugianto, ST., MP.

(Professor, University of Islam Malang, Indonesia)

Abstract

Climate Change and Its Impact on Agricultural Sectors in Indonesia

Climate change in Indonesia has been proven to have an impact on the agricultural sector and has big implications for national food security. Several studies suggest that without adapting to climate change, food crop production in 2050 is expected to have decreased quite significantly, especially rice which is the most essential agricultural product for Indonesian people. The combination of high populations density and high levels of biodiversity, along with 80,000 kilometers of coastline and 17,500 islands, it makes Indonesia as one of the countries that most vulnerable to the effects of climate change. Shifting weather patterns due to the El Nino and La Nina have made it more difficult for Indonesian farmers to decide when to plant their crops, and erratic droughts and also rain that has caused crop failure. Indonesia has lost 300,000 tons of crop production every year between 1992 - 2000, three times the annual loss in the previous decade. Climate change it means that millions of fishers in Indonesia is also facing harsh weather conditions, while reduced fish stocks has affected their income. 40 millions poor people in Indonesia, including farmers and fishermen, will be the most affected by threats including rising sea levels, prolonged drought and tropical cyclones. El-Nino and drought have a more dominant effect on decreasing the harvested area of all commodities compared to decreasing productivity. The average of national level, the decrease in harvested area of all food commodities was 0.25-11.25%, while productivity has decreased from 0.08 to 2.27%. Whereas La-Nina and flood caused a decrease in productivity of almost all commodities, but not to the harvest area.

Keywords: Climate Change, Impact, Agriculture

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THE APPLICATION OF PESTICIDES FOR CONTROLLING PEST AND ITS IMPACT TO AGRICULTURE ECOSYSTEM AND PUBLIC HEALTH

by

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ABSTRACT

One of the limiting factors for increasing agricultural production is the attack of pests. It had been done many ways of controlling insect pest, and one of them used synthetic pesticides. The study was aimed at determining the negative impacts of using pesticides on the agricultural ecosystem and public health. Study used reference studies including: scientific journals, research reports and seminar proceedings. Data of various sources were analyzed descriptively and qualitatively to answer the study problems. Result study indicated that pesticides had negative impacts on agricultural ecosystems, including resistance, resurgence, biological magnification, death of non-target organisms, secondary pest outbreaks and environmental pollutions. In addition to those negative impacts, pesticide exposure could deactivate the work of enzymes and hormones that regulated the body's homeostatic. The reactions most often arise due to pesticide exposure were heavy cough, shortness of breath and dermatitis. The organ of body most often disturbed due to pesticide exposure was liver.

Keyword: pesticides, environmental pollution, public health

PRELIMINARY

BACKGROUND

Food is one of the most crucial issues for life because whoever is human on the earth needs food. Agricultural development aims to increase agricultural production to meet these food needs which are always increasing. The success of increasing agricultural production is only possible if using modern technology, and one of them is the use of pesticides as a means of controlling plant-disturbing organisms.

Pesticides are toxic chemicals that have been widely used by farmers to kill Plant Disturbing Organisms because they are considered disturbing and harmful during crop cultivation. The use of synthetic pesticides is considered to help farmers to avoid pest attacks and agricultural production will rise. It appears that the farmers are very familiar with pesticides and have considered pesticides as part of the cultivation system so that it can led to dependence on these poisons which are feared with pesticide syndrome.

Anshori and Prasetyono (2016) stated that soybean farmers in Bantul D.I district. Yogyakarta, still relied on pesticides in its farming with the cost of pesticide application of 15.9% of the total production costs to maintain and secure soybean production from pest attacks. Meanwhile the research results of Ardiwinata and Nursyamsi (2012) explained that farmers in Central Java were accustomed to using pesticides because it was believed that pesticides were effective in dealing

with pest attacks. The use of pesticides was increasingly intensive and tended to be uncontrolled; consequently, agricultural agroecology and human health as consumers became ignored. Nevertheless, it cannot be denied that pesticides have been instrumental in increasing agricultural food production, in particular have led our country to be self-sufficiency in rice in the eighties. Pesticides have several advantages, so they are often used by farmers, the advantages are easy to obtain, easy to apply and the results can be seen quickly. The use of pesticides seems to have integrated with food crop farmers and even often become the ultimate weapon in the cultivation of food crops. However, the use of synthetic pesticides turned out to have created new problems, including the existence of increasingly negative impacts they felt result from its toxicity as a poison and lack of knowledge in large part of the community which was closely related to the use of the poison.

Pesticides that cause the most environmental pollution and threaten human health are synthetic pesticides, especially types of organochlorines because these compounds are not easily decomposed by the sun (Wilkinson, 1976; Said, 1994)

Problem

The study problems are: (1) why are synthetic pesticides still used to control pests and how do they affect the agricultural ecosystem and (2) how do pesticides affect on public health?

Study objectives

This study aims to find out why synthetic pesticides are still used to control pests and how they affect the agricultural ecosystem and (2) how pesticides affect on public health?

METHOD APPROACH

This article is prepared with a literature approach. As a source of information, the study material was obtained from several references such as: scientific journals (national and international), proceedings of seminars, and research reports. In addition, a preliminary study was carried out in two different places, namely in the upstream part: how farmers were still using pesticides intensively for controlling Opt, and in the downstream part: what were the negative effects of the poison for farmers by observing the incidence of pesticide poisoning and method of handling in Jember Regional Hospital. This was very important to see the sources of causes and objects which were caused by poisoning in the community (farmers). Then, data obtained were analyzed quantitatively descriptively to answer the proposed problems.

ANALYSIS AND SYNTHESIS

Farmers were still allowed to use synthetic pesticides. However, pesticides were part of technology in which the presence was still needed to protect the cultivated plants. Agriculture was not against synthetic pesticides, but it should be on guard that the technology was marked 'poison' that had the meaning of likely "double-edged knife" on one side, it could reduce the pest population on either side, the presence of poison could not choose friends and opponents, anyone who was exposed to the poison would be poisoned and cause death.

In the upstream part, pesticides were introduced into the agricultural ecosystem through various methods including direct spraying into agricultural and farm areas, in forests, in livestock grazing areas, in other places including in urban areas and cities, with the purpose to protect plants from pest attacks, protect livestock from insect vector diseases and other invaders.

Result of the author's survey (2012) in Pujon Subdistrict, Batu, showed that most of the Pujon villagers were still using synthetic pesticides to protect carrot, apple and mustard plants that were cultivated. In fact, in harvest season they had mixed with pleasure about 5 to 6 types of insecticides into one formulation to protect cultivation of horticultural crops.

To protect cultivated crops from pest attacks, most farmers to date were still allowed to use pesticides, but they had to follow the rules set by the government, namely in the context of integrated pest control (IPM) which was a new paradigm in agricultural development. Some principles of pesticide used in IPM according to Untung (2001) were: (a) IPM was not against pesticides, but IPM wanted to use pesticides in such a way that the principles and targets of IPM could still be maintained by reducing negative effects; (b) pesticides were used at times and places if natural control and other means of control were not able to withstand pest populations which under certain conditions were able to increase beyond the control threshold; (c) if the monitoring results required using insecticides, the type of pesticide used had to have high target selectivity and "narrow spectrum"

Negative impact of using pesticides on agricultural ecosystems

Pesticides effect the environment both biotic and abiotic. The effects of pesticides on the biotic environment include: (a) reducing species diversity by reducing the population and number of natural enemy species in the ecosystem (Pimentel, 1982); fortunately, 2001) (b) the emergence of pest resistance to pesticides: that is a type of pest which can initially be killed by an insecticide dose then becomes immune to the dose (Untung, 2001); (c) the emergence of pest resurgence, this characteristic arises when a type of pest after experiencing insecticide treatment does not decline but instead increases with the population before spraying with insecticides; Untung (2001) explained that pest resurgence arises because many causes include the killing of natural enemies of pests by pesticides so that the pest naturally has no control. (d) secondary pest explosion: insecticidal applications aimed at eradicating certain types of pests actually result in the emergence of other types of pests. This is because the insecticides used are "broad spectrum" which means they can kill various types of pests and their natural enemies

The effects of pesticides on the abiotic environment include: (a) soil and water: the soil is considered as a place to dispose of chemicals, while for pesticides it is considered a reservoir. There are many data that reveal the negative impact of pesticide treatment on soil fertility (Edward and Thompson, 1973); and (b) biomagnification: is a phenomenon of increasing the concentration of chemicals in the body of organisms along the food chain, so that the concentration of toxic substances in the body of organisms at the end of the food chain becomes thousands of times (fortunately, 2001).

Impact of Pesticides on Public Health

Pathophysiology of Pesticide Poisoning

Pesticides have an impact on health through absorption by passing through the skin, through the mouth and breathing. Absorption of pesticides through skin contact if the substance of a toxic pesticide attaches to the skin for a long time, while that through breathing through droplets, vapors and fine powders. According to Bolognesi (2003) the mechanism of pesticide intoxication through: (a) influences the action of enzymes and hormones. Work from pesticide toxins will deactivate enzyme activators so that they will interfere with synthesis, secretion, transportation and metabolism, disruption of homeostasis, reproductive system and child growth, (b) damaging tissues. Induction of serotonin and histamine production which will trigger allergic reactions and create new, more dangerous compounds.

Direct contamination of harmful substances from pesticides can cause poisoning. Poisoning is divided into three groups: (a) mild acute poisoning that causes dizziness, headache, mild skin irritation, aching body and diarrhea (b) severe acute poisoning with symptoms of nausea, chills, stomach cramps, difficulty breathing out saliva, pupil eyes shrink and pulse increases, (c) chronic poisoning with manifestations of fainting, convulsions, and even death. Chronic poisoning is more difficult to detect because it is not immediately felt and does not cause specific symptoms and signs. However, chronic poisoning for a long time can cause health problems.

Contamination through the skin is the most common contamination, although not all of them end in acute poisoning. More than 90% of cases of poisoning worldwide are caused by contamination through the skin (Djojosemarto, 2008). Risk factors for skin contamination are affected by dermal toxicity, concentration, formulation, exposed skin area and extent, and the physical condition of individuals exposed. The risk of poisoning is greater if the lethal dose 50 (LD50) gets smaller, the concentration of pesticides attached to the skin gets thicker, the form of pesticides in a form that is easily absorbed, exposed skin is more easily absorbed such as the back of the hand, the area exposed widely and if the condition of the system individual immunity is weak.

Pesticide poisoning and countermeasures

All liquid formicides can be absorbed through the skin and intestines perfectly. The most frequent types of poisoning in Indonesia are organophosphates and organochlorines. The carbamate group has similar effects to organophosphate effects, but rarely causes poisoning cases. There are still other types of pesticides such as rat poison (anticoagulant and zinc phosphite) and herbicides (parakuat) which are also very toxic.

Suharsono's (2014) study in Batu showed that the prevalence of hypothyroidism in children under five in pesticide exposure areas was 36.4%, and children under five who lived in pesticide exposure areas were 2.1 times more likely to develop hypothyroidism than children in non-exposure areas. The prevalence of stunting in the exposure area (33.3%) was higher than in the non-exposure area (17.5%). Furthermore, the results of environmental examination showed 85.0% of water samples and all soil samples were positive for pesticide residues. Several studies abroad prove that exposure to pesticides in pregnant women affects the quality of growth of children born.

The results of research by Safitrah, Kusuma & Ilham (2016) stated that pesticides became the second highest cause including organophosphate pesticides (2.8%), carbamate (2.8%) and non-specific pesticides (5.6%) which occurred intentionally for experiments. suicide and accidental drinking. Management varies among patients using antidotes, antibiotics, antihistamines, analgesics, hemostatic agents, anti-infections, and several other gastrointestinal drugs.

Prevention and management of pesticide poisoning (MOH, 2007) are as follows :

- 1) In children: do not play with pesticides, use or even hold used pesticide packaging, do not play with agricultural equipment used to spray pesticides, do not cross or swim in irrigation channels or drainage ditches, do not enter or play on land just been sprayed with pesticides, washed work clothes, shoes and hands before entering the house and before touching a child, washing vegetables and fruit as well as possible, avoiding the use of pesticides at home, especially in the home.
- 2) Pesticide poisoning on the skin: wash with soap every time you finish using pesticides, quickly change clothes affected by pesticides, immediately wash the affected body parts, pesticides with soap and cold water. If pesticides enter the eye, wash your eyes with clean water for 15 minutes.
- 3) If pesticides are swallowed if the person is unconscious, lay on a sloping position and make sure he keeps breathing. If the person is not breathing, quickly give mouth-to-mouth breathing assistance. Breathing mouth-to-mouth help can help the rescuer to be exposed to pesticides, so use a pocket mask, a piece of cloth, or a thin plastic bag whose center has been perforated before you give mouth-to-mouth relief. Look for pesticide packaging and read the label or information immediately. If the person can drink, give plenty of clean water to drink. Seek medical help if possible.
- 4) If the pesticide is inhaled leave immediately the area where inhaling toxins, especially if in a closed room. Inhale fresh air, loosen clothes to make breathing easier. Sit with your head held up and your shoulders upright. If the person is unconscious, lay on his side and watch so he can breathe smoothly. If you do not breathe, immediately do mouth-to-mouth breathing. Seek medical help.

CLOSING

Pesticides may still be used in agricultural cultivation in accordance with the prevailing rules and standards in accordance with IPM principles. IPM is not anti-pesticide, pesticides are still a part of technology that uses pesticides in such a way that the principles and objectives of IPM can still be maintained by reducing as little as possible the negative impacts. Pesticides have a negative impact on the environment including emergence: resistance, resurgence, bio magnification, death of non-target bodies and occurrence of hazard. Impact of pesticide exposure on public health is: Contamination of harmful substances directly from pesticides can cause poisoning. Poisoning is divided into three groups: (a) mild acute poisoning that causes dizziness, headache, mild skin irritation, aching body and diarrhea (b) severe acute poisoning with

symptoms of nausea, chills, stomach cramps, difficulty breathing out saliva, pupil eyes shrink and pulse increases, (c) chronic poisoning with manifestations of fainting, convulsions, and even death.

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