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Organic pesticide from urine and spices modification

Pitriyatin Rozaq* and Novicha Sofriani

Nutrition and Feed Technology Department, Animal Science Faculty, Bogor Agriculture University, Bogor Agriculture University, Indonesia.

*Author to whom correspondence should be addressed, email: pitriyatin@yahoo.com

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Abstract

Organic farming is a form of agriculture that relies on crop rotation, green manure, compost, biological pest control, and mechanical cultivation to maintain soil productivity and control pests, excluding or strictly limiting the use of synthetic fertilizers and synthetic pesticides, plant growth regulators, livestock feed additives, and genetically modified organisms. In organic agriculture the use of synthetic pesticides is not allowed. Both the EU Regulation and the IFOAM (International Federation of Organic Agriculture Movements) Norms are based on a certification of process, not on special qualities for the products that are a result of this process. Organic pesticides are safer and more environmental friendly than synthetic pesticides. Urine can be material of organic pesticide. Urine is a liquid waste product of the body secreted by the kidneys by a process of filtration from blood called urination and excreted through the urethra. Urine contains large quantities of nitrogen (usually as urea), as well as significant quantities of dissolved phosphates and potassium, the main macronutrients required by plants. Urine mixed with spices such as *Curcuma domestica* Val, *Tinospora crispa* (L.) Miers. hen jin t), *Capsicum frutescens* L, *Allium sativum* Linn. The mixed urine with spices will be fermented until resulted liquid pesticide that could solve organic farming problem in pesticide requirement

Keywords: organic pesticide, urine, spices, fermented

Introduction

In recent years, the trend of organic farming is increasing. According to Directorate General for Agriculture and Rural Development of the European Commission, since 1990 the market for organic products has grown at a rapid pace, to reach \$46 billion in 2007.

Organic farming is a form of agriculture that relies on crop rotation, green manure, compost, biological pest control, and mechanical cultivation to maintain soil productivity and control pests, excluding or strictly limiting the use of synthetic fertilizers and synthetic pesticides, plant growth regulators, livestock feed additives, and genetically modified organisms. This demand has driven a similar increase in organically managed farmland [3]. Approximately, 32.2 million hectares worldwide are now farmed organically, are presenting approximately 0.8 percent of total world farmland. In addition, as of 2007 organic Norms are based on a certification of process, not on special qualities for the products that are a result of this process. Organic pesticides are safer and more environmentally friendly than synthetic pesticides. Urine can be material of organic pesticide. Urine is a liquid waste product of the body secreted by the kidneys by a process of filtration from blood called urination and excreted through the urethra.

Urine contains large quantities of nitrogen (usually as urea), as well as significant quantities of dissolved phosphates and potassium, the main macronutrients required by plants. Urine mixed with spices such as *Curcuma domestica* Val, *Tinospora crispa* L. Miers, *hen jin t*, *Capsicum frutescens* L., *Allium ascalonicum* L., *Pithecellobium jiringa* and *Parkia speciosa*. The mixed urine with spices will be fermented until resulted liquid pesticide that could solve organic farming problem in pesticide requirement.

Wild products are harvested on approximately 30 million hectares [2]. Organic agricultural methods are internationally regulated and legally enforced by many nations, based in large part on the standards set by the International Federation of Organic Agriculture Movements (IFOAM), an international umbrella organization for organic organizations established in 1972. IFOAM defines "Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved [5].

The one important in organic farming is pesticide, when the using of synthetic pesticides is not allowed because could damage environmental ecosystem. Organic pesticides are safer and more environmentally friendly than synthetic pesticides.

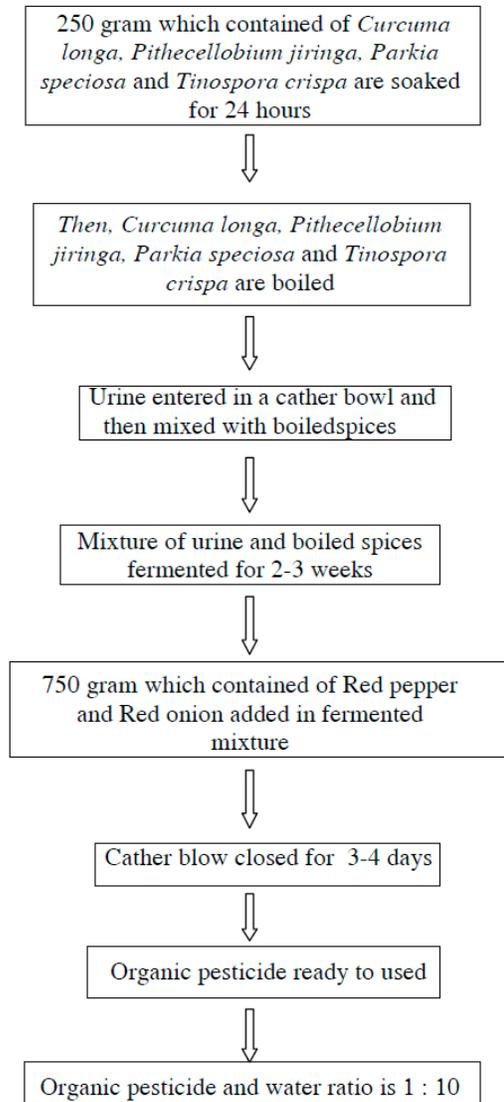
Materials and Methods

This organic pesticide could be produced in easy way. The raw materials used in this process are urine and spices. Urine is one of waste can cause pollution in our environment. In order to solve this problem some of methods should be done. One of those methods is using (both from human or animal) urine as a raw material in organic pesticide. Process of handling urine and spices can be found easily. This pesticide could be produced by adding 100 liter organic pesticide with need 100 liter urine and 1 kg spices. Spices which used are jengkol (*Pithecellobium jiringa*), Petai (*Parkia speciosa*), Kunyit (*Curcuma longa*), Brotowali (*Tinospora crispa*), Red pepper (*Capsicum frutescens* L.) and Red onion (*Allium ascalonicum*). The 1 kg spices is contain 250 gram of *Curcuma longa*, *Pithecellobium jiringa*, *Parkia speciosa* and *Tinospora crispa*, 750 gram of Red pepper (*Capsicum frutescens* L.) and Red onion (*Allium ascalonicum*). The spices choose because contain materials which can kill and inhibit pests growth of plants.

Jengkol (*Pithecellobium jiringa*) and Petai (*Parkia speciosa*) are contains amino acid and sulfur which can kill and inhibit the pests growth. Curcuma contains curcunoid which obtain polifenol, curcumin, demestoksikumin, bisdesmetoksikurkumin, volatile oil, fat, carbohydrate, protein, starch, vitamin C, minerals (Fe, posfor, and calcium). Polifenol as an antimicrobial or

plant diseases. *Tinospora crispa* contains pikroretin, alkaloid, starch, glicosida and soft dammar. Bitter components of pikroretin can kill pests. Red onion (*Alium ascalonicum*) contains volatile oil, sikloaliin, metilanilin, dihidroaliin, flavonglikosida, kuersetin, saponin, peptide, phytohormon, vitamin and starch. Volatile oil has fiber structure which can affect neural system of pests, hot effect, strong taste and smell. Red pepper contain capsaisin which as an antibiotic and give hot taste, carotenoid, alkaloid asiri, resin, oil, dan vitamin A and vitamin C.

The methods of organic pesticides making are:



Results and Discussion

A pesticide is a substance or mixture of substances used to kill a pest. A pesticide is any substance or mixture of substance intended for preventing, destroying, repelling or mitigating any pest. A pesticide may be a chemical substance, biological agent (such as a virus or bacteria), antimicrobial, disinfectant or device used against any pest. Pests include insects,

plant pathogens, weeds, birds, mammals, fish, nematodes (roundworms), microbes and people that destroy property, spread or a vector for disease or cause a nuisance. Although there are benefits to the use of pesticides, there are also drawbacks, such as potential toxicity to humans and other animals.

According to FAO (2002), a pesticide is any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals causing harm during or otherwise interfering with the production, processing, storage, transport or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs, or substances which may be administered to animals for the control of insects, arachnids or other pests in or on their bodies. The term includes substances intended for use as a plant growth regulator, defoliant, desiccant or agent for thinning fruit or preventing the premature fall of fruit, and substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport [8].

Types of pesticides include Algicides or algaecides for the control of algae, Avicides for the control of birds, Bactericides for the control of bacteria, Fungicides for the control of fungi and oomycetes, Herbicides (glyphosate) for the control of weeds, Insecticides (organochlorines, organophosphates, carbamates, and pyrethroids) for the control of insects -these can be ovicides (substances that kill eggs), larvicides (substances that kill larvae) or adulticides (substances that kill adults), Miticides or acaricides for the control of mites, Molluscicides for the control of slugs and snails, Nematicides for the control of nematodes, Rodenticides for the control of rodents, Virucides for the control of viruses.

Pesticides can prevent sickness in humans that could be caused by mouldy food or diseased produce. Pesticides are used to control organisms which are considered harmful. Commonly, in modern agricultural use synthetic pesticides which contain chemical materials. Pesticide use raises a number of environmental concerns. Over 98% of sprayed insecticides and 95% of herbicides reach a destination other than their target species, including non-target species, air, water, bottom sediments and food [no source available].

Pesticide drift occurs when pesticides suspended in the air as particles are carried by wind to other areas, potentially contaminating them. Pesticides are one of the causes of water pollution, and some pesticides are persistent organic pollutants and contribute to soil contamination. This organic pesticide contains urine and spices. All the spices contain bioactive components that could damage and inhibit pest growth.



Figure 1: Organic pesticide from urine and spices modification.

Some pesticides may damage human health and the environment, and most organic farms use less pesticides than conventional farms. The main three pesticides used in organic farming are Bt (a bacterial toxin), pyrethrum, rotenone, copper and sulphur. Surveys have found that fewer than 10% of organic farmers use these pesticides regularly; one survey found that only 5.3% of vegetable growers in California use rotenone while 1.7% use pyrethrum. Reduction and elimination of chemical pesticide use is [4] technologically challenging. Few organic farms manage to eliminate the use of pesticides entirely, organic pesticides are often used to complement other pest control strategies [9].

Pesticide runoff is one of the most significant effects of pesticide use. The USDA Natural Resources Conservation Service tracks the environmental risk posed by pesticide water contamination from farms, and its conclusion has been that “the Nation's pesticide policies during the last twenty six years have succeeded in reducing overall environmental risk, in spite of slight increases in area planted and weight of pesticides applied”. Nevertheless, there are still areas of the country where there is no evidence of progress, and areas where risk levels for protection of drinking water, fish, algae and crustaceans remain high.

Urine is a liquid waste product of the body secreted by the kidneys by a process of filtration from blood called urination and excreted through the urethra. Cellular metabolism generates numerous waste compounds, many rich in nitrogen, that require eliminated from the bloodstream. This waste is eventually expelled from the body in a process known as micturition, the primary method for excreting water-soluble chemicals from the body. These chemicals can be detected and analyzed by urinalysis. Urine contains large quantities of nitrogen (mostly as urea), as well as significant quantities of dissolved phosphates and potassium, the main macronutrients required by plants. Diluted at least 8:1 with water it can be applied directly to soil as a fertilizer.

Undiluted, it can chemically burn the roots of some plants, but it can be safely used as a source of complementary nitrogen in carbon rich compost [6]. Urine typically contains 70% of the nitrogen and more than half the phosphorus and potassium found in urban waste water flows, while making up less than 1% of the overall volume. Thus source separation and on-site treatment has been studied in Sweden as a way to partially close the cycle of agricultural nutrient flows, to reduce the cost and energy intensity of sewage treatment, and the ecological consequences such as eutrophication, resulting from an influx of nutrient rich effluent into aquatic or marine ecosystems [7]. The fertilization effect of urine has been found to be comparable to that of commercial fertilizers with an equivalent NPK rating.

Parkia speciosa (in Indonesia usually known as petai) is a plant of the genus *Parkia* in the family Fabaceae. It bears long, flat edible beans with bright green seeds the size and shape of plump almonds which have a rather peculiar smell, characterised by some as being similar to that added to methane gas. The beans has an acquired taste, but are popular in southern Thailand, Burma, Malaysia, Indonesia, and northeastern India, and are sold in bunches, still in the pod, or the seeds are sold in plastic bags. Pods are gathered from the wild, or from cultivated trees, Petai contains certain amino acids that give a strong smell to one's urine, an effect that can be noticed up to two days after consumption. Amino acid and sulfur which contained can kill and inhibit pest growth.

Jengkol is common name of the tree *Archidendron pauciflorum* (also known as *Pithecellobium jiringa*, *Pithecellobium lobatum* and *Archidendron jiringa*), native to Southeast Asia. This kind of beans are a popular food in Indonesia, and also consumed in Malaysia (where they are known as jering), Myanmar (where they are called da nyin thee or ngapi nut, named for their odor, which is similar to that of ngapi (shrimp paste)) and in Southern Thailand, where it is

called luk-nieng. The beans are mildly toxic due to the presence of djenkolic acid, an amino acid, which causes djenkolism (jengkol bean poisoning). It causes “spasmodic pain, gout, urinary obstruction and acute renal failure” [10]. The condition mainly affects men, and is not determined by how the beans are prepared, and individuals can consume the beans on multiple occasions without incident, to develop renal failure on another occasion [1].

Curcuma longa is a rhizomatous herbaceous perennial plant of the gingerfamily, Zingiberaceae [2]. It is native to tropical South Asia and needs temperatures between 20 °C and 30 °C, and a considerable amount of annual rainfall to thrive. Plants are gathered annually for their rhizomes, and re-seeded from some of those rhizomes in the following season. Its active ingredient is curcumin and it has an earthy, bitter, peppery flavor and a mustardy smell.

Turmeric contains up to 5% essential oils and up to 3% curcumin, a polyphenol. It is the active substance of turmeric and it is also known as C.I. 75300, or Natural Yellow 3. The systematic chemical name is (1*E*,6*E*)-1,7-bis(4-hydroxy-3-methoxyphenyl)-1,6-heptadiene-3,5-dione. It can exist at least in two tautomeric forms, keto and enol. The keto form is preferred in solid phase and the enol form in solution. Curcuma can also be used as an indicator (i.e. phenolphthalein, Methyl orange, etc.) of acidic or basic properties of a substance.

Brotowali (*Tinospora crispa* L.) Miers is a crippling plant and one of traditional medicine plant in Indonesia which commonly could growth in forest or house area. Its boiled stem contains bitter substance that could decrease level of glucose, high body temperature and decrease diabetes symptom. The Habitat of this plant is in high temperature area. High of stem maximum 2,5 m, single leaf to form like heart, length of stalk about 7–12 cm, has young green flower and small. Brotowali contained alkaloid such as berberina and kolumbina which obtained in stem and root, soft dammar, starch, glycoside, bitter substance like pikroretin.

Red pepper is part of family Solanaceae, genus *Capsicum* and a plant can growth in low or high land. This plant contains vitamin A, vitamin C and volatile oil like capsaicin which cause hot taste. Commonly, red pepper growth at countries in Southeast Asia, include Indonesia, Malaysia, Singapore (cili padi), Philipine (siling labuyo) and Thailand (phrik khi nu). Red onion (*Allium ascalonicum* L) is one of family Alliaceae and has fibrous root.

Based on this experiment, it proved that this organic pesticide has more advantages than synthetic pesticide because (1) non toxic effect in human, (2) does not cause environmental damage in high dosage, (3) has same effect with synthetic pesticide to protect the plant from pests, (4) fertilize the land after it degradation by the land microbial, (5) human urine has better effect to use than livestock urine because human consume many kind of food that contains biochemical materials needed in this organic pesticides.

This early research knew that human urine is not waste problem in environment and gives advantages for human life from this organic pesticide produce. Total cost for this organic pesticide production two times more cheap than synthetic pesticide market price.

Conclusions

Based on this experiment could be concluded that organic pesticide has some advantages compared with synthetic pesticide. The organic pesticide from urine and spices modification also could solve environmental problems from human and livestock waste. It also produce in simple way and easy to get the raw materials, especially in Southeast Asia. This organic

pesticide also gives some advantages such as (1) non toxic effect in human, (2) does not cause environmental damage in high dosage, (3) has same effect with synthetic pesticide to protect the plant from pests, (4) fertilize the land after its degradation by the land microbial, (5) human urine has better effect to use than livestock urine because humans consume many kinds of food that contains biochemical materials needed in these organic pesticides. It is needed more detailed study to develop this product in order to produce in large quantity.

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