

Typology of Use of Plant Growth Regulators by Farmers in Wonorejo Village, Malang-Indonesia

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ARTICLE INFO	ABSTRACT
Published Online: 27 February 2021	In an effort to increase the growth of plants, in general, farmers use growth regulator substances such as auksin, giberelin, and cytokinin. In an effort to analyze the behavior of plant growth regulator (PGRs), the purpose of this research is to analyze the typology of plant growth regulator. The research design used is descriptive qualitative. The research informant is 10 a member of Organic Farmer Group of Sumber Urip-1 Wonorejo Village, Poncokusumo Subdistrict, Malang District. The sampling technique used is purposive sampling. Data collection methods used were in-depth interviews and participant observation. Data analysis used in this research is qualitative analysis by content analysis by using Interactive Model from Miles and Huberman. In this study,
Corresponding Author: Moch. Agus Krisno Budiyanto	magna findings or concepts about the use of plant growth regulators will be analyzed based on the Social Movement Typology theory. Based on the results of the study can be concluded that the use of plant growth regulators included in Alternative Social Movement Typology
KEYWORDS: farmers, typology, plant growth regulators, social movements typology theory	

I. INTRODUCTION

Growth regulators (PGRs) are a collection of non-nutrient organic compounds (nutrients), both naturally occurring and man-made, which in very small levels (under one millimole per liter, can even be only one micromole per liter) encourage, inhibit, or alter the growth, development, and movement (taxa) of plants. PGRS which is this hormone, is naturally found in plant parts either in the roots, leaves, stems or fruit. The spread of PGRS does not have to go through the vessels, because plant hormones can be transferred through the cytoplasm or the space between cells.

There are hundreds of PGRS known to people, both endogenous and exogenous. At this time there are five main groups of plant hormones, namely auxins, gibberellins, cytokinins, ethylene, and abscisic acid. The first three groups are positive for growth at physiological concentrations, ethylene can support or inhibit growth, and abscisic acid is a growth inhibitor [1][12][14].

Giving PGRS from outside the individual plant system is also called exogenous hormone, namely by providing synthetic chemicals that can function and act like endogenous hormones, thereby being able to stimulate and

influence plants like natural phytohormones. There are synthetic PGRS that have the same function as natural PGRS, although structurally different [3][11][14].

In practice, synthetic PGRS is often more effective or cheaper when applied for agricultural purposes than natural PGRS extraction. Giving PGRS absolutely must be followed by fertilizing and intensive watering. If not, it can be counterproductive, causing plants to languish. PGRS application is only in low doses, if given in high doses, the impact will actually be detrimental, it can even inhibit the expected hormone efficacy. An example of a case occurred in Danyang City, Jinagsu Province, China (VIVAnews). The watermelon that is ready to harvest is said to have "exploded" because it grew too large than it should be. Allegedly, this is caused by the improper use of chemical drugs for plant growth.

On the other hand, based on the results of observations and interviews with the Sumber Urip-1 Farmer Group, Wonorejo Village, Poncokusumo District, Malang Regency, it can be stated that most farmers use PGRS to spur the growth and production of their cultivated crops. In an effort to analyze the behavior of PGRS use, the purpose of this study was to

analyze the typology of plant growth regulators in Wonorejo Village, Poncokusumo District, Malang Regency.

II. METHOD

The research approach used in this research is qualitative research with a qualitative descriptive research design, which is a study that wants to describe facts or phenomena using certain theories. In this study, the findings of magna or the concept of using plant growth regulators will be analyzed based on the Typology of Social Movement theory [7].

The research informants were 10 members of the Suber Urip-1 Organic Farmer Group in Wonorejo Village, Poncokusumo District, Malang Regency. The sampling technique used was purposive sampling. The number of research subjects or research informants mentioned above is considered sufficient because the information obtained is saturated (variations in information are not striking). The focus examined in this study is the typology of the use of plant growth regulators.

Data collection methods used were in-depth interviews and participatory observation. In-depth interviews (Indepth Interview) were conducted to 10 members of Sumber Urip-1 Organic Farmers Group, Wonorejo Village, Poncokusumo District, Malang Regency. Meanwhile, the participatory observation method is used to observe the behavior of farmers in using plant growth regulators. Techniques to ensure the reliability of the data obtained, the criteria used to check the validity of the data in this study include: 1) transferability by providing sufficient descriptive data to make decisions about transferability, 2) criteria for dependability, which is done by means of always review and take into account all matters relating to research data. This is done by maintaining caution, so as to avoid possible errors in pseudo-data collection and interpretation, and 3) Confirmability, which is done by making agreements or checking repeatedly with data sources so that the data obtained is objective.

The data analysis used in this research is qualitative data analysis by means of content analysis. Content analysis is a systematic technique for analyzing the meaning of messages and how to express messages. The steps taken in content analysis in this study used an interactive model from Miles and Huberman. This model contains 4 interrelated components, namely 1) data collection, 2) data simplification or reduction, 3) data presentation, and 4) drawing and testing or verification of conclusions.

III. RESULT AND DISCUSSION

Inorganic (Synthetic) PGRs Used by Sumber Urip-1 Farmer Group Members

Atonic

Atonic growing substances contain active ingredients sodium arthonitrophenol, sodium paranitrophenol, sodium

2,4, dinitrophenol, IBA (0.057%), and sodium 5 nitrogulacol which can increase plant growth. In the way it works, atonics are quickly absorbed by plants and stimulate the protoplasmatic flow of cells, and accelerate germination and rooting, but if the concentration is excessive it can inhibit growth. This is because atonic (Figure 1) is one of the growing substances that work at low concentrations, if the atonic concentration in the plant is still high enough, it will act as an inhibitor, which inhibits the metabolic process [9].



Figure 1. Atonic PGRs

Source: <http://www.lembahpinus.com>

The application of atonic can increase the permeability of the cell walls which will enhance the absorption of chlorophyll-forming nutrients which are very necessary in the photosynthesis process [9].

Atonic is included in the Auxin PGRs. Auxins are plant hormone substances found at the ends of stems, roots and flowers that function to regulate cell enlargement and trigger meristem cell elongation. The hormone auxin helps the growth process, both in the form of root growth and stem growth, accelerates seed germination, helps cell division, accelerates fruit ripening, and reduces the number of seeds in the fruit.

Plants that are exposed to the sun on one side will have slow growth because auxin is inhibited by the sun, but the side of the plant that is not exposed to sunlight grows very fast because auxin work is not inhibited. So this will cause the tips of these plants to tend to follow the direction of the sun or what is called phototropism. For plants that are placed in a dark place, the growth is very fast but the texture of the stems is very weak and the color tends to be pale yellowish. This is because the auxin hormone is not inhibited by sunlight. Whereas for plants that are placed in a bright place, the growth rate is slightly slower than plants that are placed in a dark place, but the texture of the stems is very strong and also has a fresh greenish color, this is because the work of the auxin hormone is inhibited by sunlight [3][6][9][13][18].

GibGro

GibGro 10 SP (Figure 2) is a PGRS containing 10% gibberellin acid which functions to increase yields of rice and maize crops, both in terms of quantity and quality. The advantages of Gibgro products are: 1) it is a growth regulating agent that has an effect on increasing the morphological and physiological effects of plants in low doses and 2) it increases the size of leaves, stems and branches, accelerates the rate of fertilization and increases the size of plant fruit, accelerates seed germination, and accelerate the emergence of shoots on seeds [15].



Figure 2. GibGro PGRs [15]

Progib

Progib 20 SL (Figure 3) is a clear white liquid plant growth regulator which is a combination of potassium nitrate, magnesium and growth promoter from the triazoles group as a stimulant for enlargement of sweet potatoes. Progib 20 SL with active ingredient gibberellic acid 20 g / l is used as a source of gibberellic acid [17].



Figure 3. Progib ZPT [16].

GigGro and Progib are PGRS in the gibberellin group. This group is the group that is most structurally similar, and is named with the sequence number of the invention or manufacture. The first compound discovered that had a physiological effect on plants was gibberellic acid 3 (GA3). Gibberellin (GA) is a hormone that can be found naturally in almost all plant life cycles. This hormone affects seed germination, stem elongation, flower induction, seed development and pericarp growth. Gibberellins in plants can be found in two main phases, namely active gibberellins (GA Bioactive) and inactive gibberellins. Biologically active gibberellin (bioactive GA) controls various aspects of plant growth and development, including seed germination, stem elongation, enlargement of leaves and flowers and seed development. Until 2008 there were more than one hundred GA have been identified from plants and only a small number of them, such as GA1 and GA4, are thought to function as bioactive hormones [18]. Gibberellin not only promotes stem elongation, but also the growth of all plants, including leaves and roots. When gibberellin is given under the canopy, the increase in cell division and cell growth appears to lead to stem elongation and, in some species, the development of leaves takes place faster, thereby increasing the photosynthetic process [3][9][18].

Organic Growth Regulator Used by Farmer Groups Sumber Urip-1

In making organic growth regulators, the Sumber Urip-1 Farmer Group uses natural ingredients that are easy to obtain and of course contain very useful substances or growth hormones, for example: shallots, snails, sprouts, banana weevils, and sweet corn.

The way of making organic growth regulators is: 1) Preparing the materials to be used. For example using the main ingredients of snails, 2) PGRS is made with the following composition: 1 kg of snail, 5 liters of coconut water, 5 liters of “leri” water, 4 tablespoons of granulated sugar, 3) Smooth all ingredients, 4) Ferment the mashed ingredients for 1 week-10 days with daily stirring, and 5) PGRS which is ready to use will show characteristics, among others, there are no bubbles or foam when the PGRS solution is shaken, as well as the visible storage place during fermentation becomes shrinkage due to air in storage less.

The way to use organic growth regulators is: 1) direct use of spraying on the parts of the plant with a dose of 120 ml for 15 liters of spraying sprayer and 2) Before spraying, it must be ensured that the nutrient availability in the soil is sufficient within 1 week before using the organic PGRS.

Based on the results of observations and interviews with the head of farmer groups and farmer members, it was found that the suggestion of farmer groups to use organic PGRS products was not yet a movement for all members of farmer groups. Only most of the members of the farmer groups have followed the directions of the farmer groups to use organic PGRS.

"In general, members of farmer groups use organic PGRS except in the rainy season where the rainy season the organic PGRS adhesive is not good," said Mr. Abdul Fatah, Head of Sumber Urip-1 Organic Farmers Group.

Organic PGRS can be made by yourself using natural ingredients that are available in nature.

"Yes, it's cheaper organic, because it could be 2 times cheaper than chemical, right, it's only 14 thousand", according to the statement of Mr. Abadi Yulianto, a member of the Sumber Urip-1 Organic Farmers Group.

Organic PGRS has no side effects (safe). After harvest, it can be consumed immediately.

"If it's organic, the term we call cabbage, so we take the term, take it, then eat it, it's okay, it's safe." Suwito explained, as a member of the Sumber Urip-1 Organic Farmers Group.

Organic PGRS does not need to increase the dose if the use is continued.

"In organic PGRS, sometimes it keeps on when we use it all the time, it actually decreases, from 15l / l maybe the next 12, 10 so it's organic. It is different from synthetic PGRS which results in resistant plants so that the dosage used will continue to increase" explained Pak Rokhim as a member of the Urip-1 Organic Farmer Group.

Based on this, it can be stated that the use of plant growth regulators is included in the typology of Alternative Social Movement. This is because the farmer group policy can only change some members of the farmer group. According to Aberle, Cameron, and Blummer in Jannah[4], in the Alternative Social Movement, the goal of this social movement is a change that is limited to only a part of the population.

According to Aberle in Kornblum[7] typology is an attempt to classify something based on certain characteristics. There are four types of social movements in the agricultural sector as follows: 1) Alterative Movement, this movement is a movement that aims to change some individual behavior. In this category, we can input various outreach, meetings, promotions, distribution of leaflets or brochures which are sometimes done to change the behavior of farmers in the direction desired by the farmer group, 2) Rodemptive Movement, this movement is wider than the alterative movement, because what it is trying to achieve is overall change in group behavior. This movement is achieved by counseling, meetings, promotions, distributing leaflets or brochures regularly and continuously to change the behavior of all farmers to the direction that the farmer groups want, 3) Reformative Movement, in this movement that wants to be changed are not individuals or groups of farmers but also communities in around farmer groups but the scope to be changed is only certain aspects of society, for example the movement for the use of biological

materials in agricultural cultivation, and 4) Transformative Movement, this movement is a movement to change society as a whole, for example a movement that pioneered organic agriculture in total and whole.

Meanwhile, the effectiveness of organic PGRS used by the Sumber Urip-1 Organic Farmer Group is in accordance with several facts and research results. According to Sugiyatno [16], onions contain essential oils, cycloaliin, methylaliine, dihydroaliin, flavoglycosides, quercetin, saponins, peptides, phytohormones, vitamins, and starch. Onion extract which contains auxins, proteins, carbohydrates, and vitamins found at the base with available nutrients and encourages cell division at the base and shoots.

According to Chaniago [2], snails, golden snails, and shellfish can produce the hormone auxin. Mollusca has high tryptophan amino acid compounds which will provide a large enough PGRS IAA. According to Latunra et al [8] green bean sprouts extract has a concentration of auxin growth regulating compounds of 1.68 ppm, gibberellin 39.94 ppm, and cytokinins 96.26 ppm. Giving green bean sprouts extract helps the process of growth and enlargement.

According to Kandarihi [5], young corn kernels contain 30% natural cytokinin or zeatin. Cytokinins found in plants can play a role in the process of cell division, plant organ formation, prevention of chlorophyll damage, and development of buds. According to Muvidah et al [10], in a banana weevil there are growth regulators of gibberellins and cytokinins.

IV. CONCLUSION

Based on the research results, it can be concluded that the use of plant growth regulators in the Sumber Urip-1 Organic Farmer Group is included in the typology of Alternative Social Movement. This is because all social movements of farmer groups have not been able to convert all members of farmer groups to use organic PGRS.

Based on the results of the research and the above conclusions, it can be suggested that it is necessary to raise awareness of the use of organic growth agents for members of the Sumber Urip-1 Organic Farmer Group in Wonorejo Village, Poncokusumo District, Malang Regency with the hope that all members of the farmer groups are able to produce better organic food products. according to aspirations of the members of the farmer group.

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