

NARRATIVE REVIEW: UTILIZATION OF HORTICULTURAL COMMODITY PLANT TISSUE CULTURE TECHNOLOGY AS A HALAL BIOTECHNOLOGY METHOD FOR FOOD AND PHARMACEUTICAL PURPOSES

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Abstract: Horticultural Commodity Plant is one of the commodities consisting of fruit vegetables, drugs, and spices. The advantages and disadvantages of hortikultura commodity crops are one of the challenges that need to be considered in meeting the needs of the food and pharmaceutical industry which is increasingly out of control in terms of demand. One solution that can be provided for researchers in the field of biotechnology in helping farmers to accelerate the process of crop propagation is through tissue culture techniques. The advantage of such methods is that the plants are produced genetically uniformly with their mother. The research method carried out is to collect data sources from the results of previous research. The results of the review obtained horticultural commodity crops that are propagated through tissue culture methods have prospects in the field of food and pharmaceuticals. The conclusion in this review is that horticultural commodity plant tissue culture technique is a halal biotechnological method in the propagation of plants in vitro to meet the interests of the food industry such as nutrition or nutraceutical and pharmaceutical such as cosmetics or cosmetics, herbal medicine and phytoarmaka. Some horticultural commodity crops with various problems through tissue culture techniques include panili, pepper, and tobacco. Purwoceng (*Pimpinella pruatjan*). Temu puteri (*Curcuma petiolata*). Puar (*Elettaria sumatrana*). Pulepandak (*Rauwolfia serpentina*). Pulai (*Alstonia scholaris*). Bidara upas (*Merremia mammosa*). Inggu (*Ruta angustifolia*). It is an example of a horticultural commodity plant that has been successfully stored through tissue culture techniques as a collection of germplasm in vitro.

Keywords : Halal Biotechnology, Tissue Culture, Horticulture, Food, Medicine.

INTRODUCTION

Horticultural commodity plants are one of the plant commodities consisting of vegetables, fruits, drugs, and spices. The components contained in these commodities certainly have a very important role both in terms of food and pharmaceuticals. On the food side, especially vegetables are foods that are of high nutritional value and also have sufficient sources of antioxidants in preventing various diseases. Similarly, in the pharmaceutical side today there are many horticultural commodity plants that are used as active substances in herbal and cosmetic drugs. The advantages of horticultural commodity crops certainly make farmers always protect certain groups to be able to meet the needs of the market and industry that are



increasingly high from the aspect of demand. While on the other hand the weakness of horticultural commodity crops include being climaterik (can not bear to store / easily rot), easily damaged due to transportation for delivery from one place to another that is often not well controlled, and susceptible to disease (Mubarok et al., 2015).

The food and pharmaceutical industry that utilizes many horticultural commodity crops in terms of advantages and weaknesses makes researchers engaged in biotechnology to tend to provide solutions for farmers or farmers of horticultural commodity crops who always experience complaints due to losses in cultivating their crops conventionally even discouraged because they are unable to meet market demand that continues to become uncontrollable and increasingly depressed. One solution for researchers who move in the field of plant biotechnology / utilization of living things (Fadhillah et al., 2021) is through plant tissue culture methods. Plant tissue culture is one of the plant cultivation methods developed in vitro and controlled in the laboratory that is aseptically, so that the genetically produced plants correspond to their parent (Elma et al., 2017).

Another advantage of plant tissue culture methods is that in addition to clones produced uniformly with their parents genetically have requirements that need to be met. The conditions that need to be met in the plant tissue culture method include seeds or seeds that will be propagated are healthy or disease-free clones (Munggraini et al., 2018), so that they are guaranteed to be conditioned from a controlled environment of nutrients in vitro in a heterogeneous or uncontrolled environment, of high economic value, and able to be produced in standard laboratories because of this in vitro cultivation technique in addition to being controlled. It does not depend on the seasons such as general or conventional cultivation of plants.

Talking about halal in a biotechnological perspective on the advantages of plants that dhasilkan through tissue culture methods is one of the right efforts in saving rare plants with adequate phytochemical sources in supporting healthy food. It depends on the use of the right growing media and regulatory substances (Rezaldi et al., 2022). The source of phytochemicals produced through plant tissue culture methods is callus. Callus is the time of a primordial cell that is not perfect to synthesize into a true organ.

In this regard, in this study will review the potential of horticultural commodity plant tissue culture as a halal biotechnological method in food and pharmaceutical studies oriented to the interests of nutrition and nutraceutical, cosmetics and cosmetics, Herbal medicine and Phytoarmaka, and several species of horticultural plants that have been studied with various problems (Mariska, 2002).

METHOD

In this review article researchers by collecting the source of data from previous research results that have been published from various scientific journal literature. Library searches in



the form of primary libraries are done online using Google and some websites as a source of online journal providers.

RESULT AND DISCUSSIONS

1. Nutrition and Nutraceutical

Nutritional products that can be used as a drug in conditions of malnutrition or better known as malgizi / malnutrition. Nutritional products are ideally in the form of parental nutrition for patients who are hospitalized and also in the form of enteral nutrients that are already known as food supplements such as vitamins, minerals, and also amino acids.

Malnutrition can also occur due to chronic diseases such as kidney failure, heart failure, lung obstruction, congestive heart failure, diabetes), gastrointestinal diseases such as peptic ulcers, gastrointestinal inflammation, and pancreatitis. In addition, social factors become one of the triggers of chronic and gastrointestinal diseases such as addiction in consuming alcohol or drugs that cause complications overall. Patients who are given nutrition aim to improve nutritional status, improve the immune system, and improve the quality of life of patients.

Society predominantly utilizes nutritional products to treat diseases, combining nutrients and treatment effects to give birth to a new idea known as Nutraceutical. Nutraceutical has also been widely known as Phytochemicals, Medical Foods, Functional Food, Pharmafoods, and Nutritional Supplements. These terms in nutraceutical can be defined as natural materials available in pure or concentrated or bioactive compounds that have an effect in improving health, preventing disease, even treating diseases. Examples of natural chemical compounds that act as nutraceutical include beta carotene which acts as a deterrent to heart attacks, and glucosamine which acts as a treatment for osteoarthritis. Obesity is another factor that gives rise to other diseases that need to be handled properly apart from nutritional matters.

The tendency of the dominant society in selecting nutrients with the aim of preventing and treating diseases rather than selecting drugs is an opportunity for pharmaceutical researchers to contribute as nutritional preparations, dietary supplements, and nutraceutical to a composition that suits the needs of the body with a safe category.

2. Cosmetics and Cosutical

The utilization of cosmetics according to the Food, Drug, and Cosmetic Act (FD & Act) is more aimed at cleaning, improving beauty, and increasing attractiveness and changing the appearance on the one hand rather than as a special medicine on the skin organs. Skin moisturizers, perfumes, lipsticks, nail polish, eye makeup, facial or powder makeup, shampoos, hair-kiting liquid preparations, toothpaste or odol, deodorants, and soaps (baths, hand washes, rinso) are examples in pharmaceutical preparations that belong to the cosmetics group. But on the other hand, The FD & C has also classified between drugs with cosmetics or vice versa between cosmetics and drugs. The term cosmetics in the pharmaceutical preparation industry is known as kosmeutical.



Cosutical is a part of the term cosmetic product that contains active substances and is responsible as a drug or pharmaceutical. Anti wrinkle creams, baldness, treatments, antiperspirants and sunscreens are examples of cosmetic products that are responsible for pharmaceutical or medicinal. Classification or grouping between cosmetics with cosutical is often fooled or makes it difficult for regulatory bodies such as the American Food & Drug Administration, such as deodorant can be categorized or grouped as cosmetics but if declared as an antiperspirant it has the potential to be classified as a drug because it acts as a pore cover on the underarm skin.

While cosmetics are available in the Regulation of the Minister of Health of the Republic of Indonesia as preparations or guides of materials that are ready to be used on external skin organs such as the epidermis, hair, nails, lips, external genital organs, teeth, and oral cavities that serve to clean, increase attractiveness, change appearance so as to protect in good condition, prevent the occurrence of body organ odor, but not to be intended as a treatment or cure in a disease.

The use of cosmetics and cosutical is expected to increase drastically due to rural culture towards urban and improved living standards of the community, so it is a challenge for the pharmaceutical world in increasing its role as a producer of products with various formulas that are better, safer, and easy to use.

3. Herbal Medicine and Phytoarmaka

The state of Indonesia with a population exceeding 200 million people, of course, potentially approximately 30,000 species of plants and 940,000 species including nutritious plants (180 species have been used by the traditional herbal medicine industry) which is a market opportunity for herbal medicine or phytoarmaka.

The use of natural materials as traditional medicine in Indonesia in general has been done by our ancestors since centuries and has also been proven from the availability of old manuscripts on the leaves of lontar Husodo (Java), Usada (Bali), Lontrak pabbura (South Sulawesi), Primbon Jampi fiber documents, Racikan Boreh Wulangan Dalem fiber, and borobudur temple reliefs that depict humans who are concocting medicine (herbal medicine) with plants as raw materials.

Drugs with natural active substances or herbal remedies have been widely accepted both in developed and developing countries including Indonesia itself. Who states that about 65% of the population is advanced and 80% of developing countries have utilized herbal remedies (U.S. Food & Drug Administration, 2002). This is one of the factors supporting an increase in the use of herbal medicines that occur in developed countries in the hope that their age can be longer when there is a prevalence of the increase in a chronic disease, as well as the failure of the use of modern drugs in certain diseases such as cancer which is a wider network of information in tracking the use of herbal medicines around the world (Master Plan, 2003).

4. Several Types of Horticultural Commodity Crops that have been studied with Various Problems Through Tissue Culture Techniques

Horticultural commodity plants, especially fruit parts in Indonesia, have been widely used as antioxidants by the public. Antioxidant properties such as polyphenols, flavonoids, vitamin C, E, and beta carotene (Hani & Milanda, 2016) are bioactive components that are used as drugs, cosmetics, and nutraceutical. Plants with horticultural commodities that are widely used as medicinal, cosmetic, and food ingredients that have been propagated through plant tissue culture in general aim to produce and improve post-harvest quality that is increasingly difficult to develop in ordinary vegetative cultivation which is one of the conventional cultivation techniques with various problems.

In vitro selection is one method of monoclonal or genetic uniformity. That causes influence and efficiency or is oriented towards the same or uniform desired traits between the parent and the resulting generation. Some horticultural commodities that have been selected to be developed through plant tissue culture techniques and are valuable in food and pharmaceutical aspects include Panili, Pepper, and Tobacco.

Panili (*Vanilla planifolia*) is one type of horticultural commodity plant that has been selected in propagation in vitro. Selection in the plant is carried out in the part of the globular structure with a size of 1 mm selected using chemicals, namely fusaric acid and also filtrate from *Fusarium oxysporum*. Selection that has been done gradually is the buds of the results of regeneration selected by crossing on other species selection components. Provisional results have proven that shoots result from the regeneration of globular structures that are not selected when injected to die through in vitro screening. But the buds that have been produced through the selection process remain alive, so morphologically there is a difference. This is because the inoculum that comes from fusaric acid becomes thin at the root, while the inoculum that comes from the filtrate *Fusarium oxysporum* becomes thick on the leaves and more visible green (Sukmadjaya & Husni, 1996).

Pepper (*Piper nigrum*) is a horticultural commodity plant that has been selected in vitro with the aim to overcome problems related to *Phytophthora capsici* disease, which is a pathogenic mushroom that comes from the soil and has the potential to cause foul disease at the base of the stem of the pepper plant. In improvements with this tissue culture method it has been seen that calluses that have been induced with filtrate *P. capsici* have produced about 8 somaclones that are digitized in the greenhouse.

Tobacco (*Nicotiana tabacum*) is part of a horticultural commodity plant that has properties as an allergy reliever, and antidiabetic in low doses. The tobacco has been successfully cultured in vitro through anther culture where in the tobacco plant breeding program there is an activity that is the regeneration of somatic embryogenesis pathways using MS media plus 0.30 mg / L GA3 and 750 mg / L glutamine.

Storage of horticultural commodity plants, especially rare medicinal parts through plant tissue culture techniques in Indonesia is one of the stages that need to be saved as an in vitro collection. Purwoceng (*Pimpinella pruatjan*). Temu puteri (*Curcuma petiolata*). Puar (*Elettaria sumatrana*). Pulepandak (*Rauwolfia serpentina*). Pulai (*Alstonia scholaris*). Bidara upas (*Merremia mammosa*). Inggü (*Ruta angustifolia*). It is an example of a horticultural commodity plant that has been successfully stored through tissue culture techniques.

CONCLUSION

Conclusions in this study include the technique of horticultural commodity plant tissue culture is a halal biotechnological method in the propagation of plants in vitro to meet the interests of the food industry such as nutrition or nutraceutical and pharmaceuticals such as cosmetics or cosmetics, herbal medicine and phytoarmaka. Some horticultural commodity crops with various problems through tissue culture techniques include panili, pepper, and tobacco. Purwoceng (*Pimpinella pruatjan*). Temu puteri (*Curcuma petiolata*). Puar (*Elettaria sumatrana*). Pulepandak (*Rauwolfia serpentina*). Pulai (*Alstonia scholaris*). Bidara upas (*Merremia mammosa*). Inggü (*Ruta angustifolia*). It is an example of a horticultural commodity plant that has been successfully stored through tissue culture techniques as a collection of germplasm in vitro.

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