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ALTERNATIVE ECONOMIC INNOVATION OF HEMP RESEARCH IN THAILAND

SUJINNA KANNASUTA
Department of Environmental Science, Faculty of Environment,
Kasetsart University

Abstract

Research of hemp in Thailand should be research and development of hemp to benefit the wider community's economic promotion through community enterprises. Community enterprises located in various locations throughout the country, which have different environments for growing hemp, which in this research, it suggests that they have the effects on the growth, types, and quantity of medical substances in hemp grown from different environments. However, traditional medicine, health products, and biomass products containing important substances obtained from the cultivation of hemp grown in various areas should be researched and developed creatively combining with local wisdom according to the way of life of each region throughout the country. And testing the use of various products should be conducted and then promoting to the market both local and abroad. In case of utilization for the energy storage industry, hemp can use the hemp carbon of cellulosic fibers produce as supercapacitors with hemp-based carbon electrodes, some research on hemp-based carbon nanomaterials outperform standard supercapacitors.

Keywords: Alternative Economic, Innovation, Hemp Research in Thailand

Introduction

The promotion of hemp as an economic crop for Thailand should be studied in many areas, including cultivation, utilization, and in the aspect of wastes that occur from the utilization process which will have an impact on the environment, while it should be appropriately managed as well. In the case of product development from fiber and seed to add value, cost-effectiveness in economic throughout the supply chain of hemp utilization should be considered as well. The study should also cover the possibility of using hemp in various industries such as the paper industry, construction materials, autos, food, and cosmetics, etc. However, as for related rules and regulations, in promoting the cultivation of hemp plants as economic crops, an exception in laws, regulations and regulatory measures should be considered. And this, the production, distribution, import/export of fibers or seeds and products from fibers or seeds of hemp including research studies for breeding must be governed with a licensing system for growers and researchers and the regulation system which must be strictly complied with (Suraphon Nonthakarnkitkun, 2009).

In biology Hemp is in a family of Cannabaceae its scientific name is similar to Cannabis sativa L. The difference is the level of subspecies. Cannabis is named as Cannabis sativa L. subsp. Indica (Lam.) E. Small & Cronquist while hemp is named as Cannabis sativa L. subsp. Sativa. And marijuana and hemp are a biennial plant, about one-year-old. The trunk is upright with a height of around 1-6 meters. The leaves are single, palm-shaped leaves, toothed edges having a deep concave shape to the base. The upper surface of the leaf is darker than the lower leaf. The flowers are small, white, blooming in auxiliary buds and at the apex. The seeds are dry, gray, and ovate-shaped, with a wide acute angle with a smooth, glossy surface. Although both plants are similar in botanical but there are still many different physical characteristics that require the expertise of botanists to differentiate.

In researching for the development of cannabinoids measurements in marijuana plant using Fast Red B salt colorant to improve the extraction efficiency of Tetrahydrocannabinol

(THC) and Cannabidiol (CBD) in marijuana and hemp by using Fast Red Salt colorant to differentiate solvents used in the study of the efficacy of extracts which include methanol, ethanol, hexane, and diethyl ether solvents. Results from the experiment reveal that Tetrahydrocannabinol becomes orange-yellow while Cannabidiol becomes reddish-orange. Therefore, marijuana contains a high amount of Tetrahydrocannabinol with color in orange-yellow while hemp has a high amount of Cannabidiol with a reddish-orange color (Paphanan Soisuwan, 2013). And there is a study of methods in producing certified seed of Hemp according to the Ministerial Regulations in apply for a license to produce, distribute or possess of drugs in Category 5, B.E. 2559, only for Hemp in which in the past, the planting of hemp was for use in the living of tribes in the highlands, especially the Hmong people. Hemp is illegal in the past, as it is a plant of the same family as marijuana.

These two plants mentioned above contain Tetrahydrocannabinol, an important substance that causes narcosis and has an addictive effect. In this study, the samples are collected from inflorescences and leaves periodically every 60, 90 days and during blossom totaling 687 samples and for analysis at the Medical Science Center in Chiang Mai in order to find the amount of Tetrahydrocannabinol substance. From the study, it is found that there are 3 species that contain THC not more than 1% per dry weight as required by law which is cultivated in a different environmental and geographic condition. What government agencies need to in addition to this is to collect samples to confirm the exact amount of Tetrahydrocannabinol content in the specified amount and submit this matter to the meeting of the Committee of Narcotics for considering announcing as a certified seed (Teerachai Phiriyasak, 2561).

There are many utilizations of hemp both in medical and health products and many others. Substances found in hemp are important in medicine and health consisting of the main substances such as Cannabidiol (CBD) and Tetrahydrocannabinol (THC). In the process to differentiate between hemp and marijuana by measuring cannabinoids content using Fast Red B salt colorant, by extracting Tetrahydrocannabinol (THC) and cannabidiol (CBD) using methanol, ethanol, hexane, and diethyl ether solvents, the results reveal that Tetrahydrocannabinol becomes orange-yellow while Cannabidiol becomes reddish-orange.

Therefore, marijuana contains a high amount of Tetrahydrocannabinol with color in orange-yellow while hemp has a high amount of Cannabidiol with a reddish-orange color (Paphanan Soisuwan, 2013). And in using hemp seeds as food, it's found that hemp contains higher Nutritious protein than in soy protein, in a higher quantity and a cheap price which can be substituted for soy protein. The seeds also contain high unsaturated fatty acids in a suitable ratio suitable for that the body can use. It contains gamma-linoleic acid which has an anti-inflammatory effect (Qureshi A.A.et.al, 1984). In the case of using as fiber material, hemp plant should be harvested at the age of 70-75 days, which is the period that the fiber quality is most appropriate, fineness, best for making clothes and textiles. But if harvested during the 90 days, the fibers will look coarse but stickier, better for use to make rope or other appliances. And when comparing the 3 varieties of hemp planted in the same area during the month of June, it is found that the Huai Mae Kiae species cultivated at the center of tropical vegetation become more productive than the rest two species but in a small proportion.

This may be due to the different processes in stripping the fibers. And the Ban Rom Klao Plant Center uses the method by stripping fibers from the Hemp tree, drying to sunlight for about 7 days before peeling only the outer covering and it is quite difficult to peel off. As for the tropical vegetation center, the method of peeling fibers after harvest is used, which is found that it's easier to peel off. And after that, the fibers are dried. When studying in the correlation of various factors, it's found that the amount of THC is related to the time of planting and related in the same direction to the amount of CBD but in the opposite direction to the height of the planting area at the significant level of 0.05 That is the quantity of THC tends to

decrease with the height of the planting area. In studying for the important components including THC, CBD and CBD / THC ratios for the identification of marijuana and hemp, when using De Meijer criteria, it is found all 3 varieties in all 3 planting areas are classified as intermediate types with the CBD / THC ratio that is not significantly different. As for hemp planted in Chiang Mai and Tak provinces, it is classified as Drug Type. And the CBD / THC ratio should be probably used as a breed indicator.

It is found that in the same breed, the CBD / THC ratio is not different in all age groups while the Huai Mae Kieang, Pang-Ung and Phobphra species will have the average CBD / THC ratio of 0.87, 0.97, and 0.77, respectively. Suggestion: Areas with relatively high temperatures and the amount of rainfall are not too high, which will result in hemp to have a high THC value of about 1 percent, but when compared with marijuana, there is a clear difference. Where marijuana has a THC content of more than 2 percent while the CBD / THC ratio of marijuana is relatively lower than that of hemp about 10-20 times. This CBD / THC Ratio should probably be used as a criterion for classification between marijuana and hemp (Suraphon Nonthakarnkitkun, 2009). However, there is various information regarding the use of hemp and marijuana in terms of the belief in the offerings to sacrifice Shiva that worshipers will drink at a sacrifice ceremony in India. And in the country that has local wisdom, they will be used as a cooking ingredient and for the long-term medication (Supanika Chaisaman, 2018). And in using for health promotion, hemp is used in many areas, including the manufacturing of paper, textiles, plastics, skin care products, construction products, chicken feed, fuels, matting materials for livestock, supplements, essential oil, medicine, and food. Oil from hemp seeds contains a small amount of THC, but contains a high amount of omega-3 and protein, which has nutritional value that helps nourish the heart, stimulates the brain, stimulates the immune system, lower blood pressure and blood fat, helps nourish the skin and hair as well as helping in the treatment of arthritis improving the digestive system and help cure the cancer. Hemp and marijuana in Cannabis contain 400-500 types of chemicals. Female inflorescences contain a resin which consists of the main substance, that is phytocannabinoids which need to be processed through a heat extraction process under the temperature of approximately 122-140 degrees Celsius so that to obtain Cannabinoids which contains the two main active substances; Tetrahydrocannabinol (THC) and Cannabidiol (CBD) which can bind to CB1 receptors which are in the brain and central nervous system and can also bind to CB2 receptors in the immune system. In addition, it also contains Terpenes and Flavonoids substances. And the extraction method results in different active ingredients. (Government Pharmaceutical Organization and Network Parties, 2019)

Planting hemp in different areas and weather conditions has a significant effect on hemp content. It is found that the factors affecting THC content in addition to the planting time, it also depends on the temperature and amount of rainfall. That is, in the planting area with relatively high temperature and not too high amount of rainfall will result in the hemp to have a high THC. In foreign countries, hemp plants grown for fiber use are called Fiber Hemp or Industrial Hemp is allowed to grow in Europe, Canada by requiring that the THC must not exceed 0.3 percent. However, in Queensland Australia where the climate is similar to Thailand, up to 1 percent of THC is allowed. In studying the relationship between the number of important substances and the time of planting by comparing hemp of Pang-Ung varieties planted at different times at the tropical vegetation center, the results reveal that the THC amount in hemp grown in June is higher than that planted in August. In addition, the flowering period of both male and female flowers of the hemp planted in August is found that the blooming and fruiting period is faster than that of hemp planted in June. This is due to Hemp is a Short-Day Plant that needs a lot of sunlight to grow.

Therefore, if planted during the short day, the flowers will bloom faster than usual. Thus, such a kind of period is suitable for planting for seeds for the hemp obtained from the

survey in Chiang Mai and Tak provinces. However, there are the studies of various ages of hemp planted in various areas, in various environmental conditions as related to importance substance by studying in Thailand at tropical highland vegetation center, Queen Sirikit Botanical Garden in Mae Rim district, Chiang Mai Province where is a sloping hillside approximately 1,300 meters above sea level with the average temperature about 16-26 degrees Celsius , the average rainfall of about 1,400 mm per year with relative humidity 88 percent and there are 165 samples of hemp species such as Huai Mae Kieang, Phop Phra and Pang-Ung planted in there. Study results suggest that all 3 cultivated varieties have no significant difference in THC and CBD at the level of significant different of 0.05, but it is found that the major substances of hemp are different in case of planting at different times. In terms of the amount of important substance of hemp, Pang-Ung varieties planted in August has the substance less than those planted in June. While in the nursery planting (Huai Tat), the Queen Sirikit Botanical Garden in Mae Rim district, Chiang Mai, it is a foothill flatland area approximately 1,000 meters above sea level with the average temperature about 19-28 degrees Celsius, having the average rainfall of about 1,270 mm per year and relative humidity of 88.13 percent where the experimenting in planting marijuana is conducted which includes the Phop Phra, Huay Ma Kieang and Bang-Ung species of a total of 55 samples which is found that the 3 varieties of hemp have no significant difference between THC and CBD levels and while the quantity of content is relatively high. And in Ban Romklao Plant Center under the Royal Initiative in Chat Trakarn District of Phitsanulok Province where is a foothill plain area approximately 1,000 meters above sea level having the average temperature about 15-25 degrees Celsius with the average rainfall of1,893 mm per year, relative humidity about 62.5 percent. The experiment in planting hemp varieties of 93 samples such as Huai Mae Kieang and Phob Phra varieties is conducted here.

The results find that both hemp varieties have the same THC content but different CBD content. That is hemp planted in April has more CBD than the one planted in June. And the case study of the relationship of the amount of important substance with age, the result reveals that the THC content increase when hemp is older and the THC found to be highest during male flowering. In addition, the duration of planting affects the amount of important substances in hemp for both THC and CBD. Hemp planted in April has higher THC than that planted in June and August due to hemp growing during April has a longer Vegetative Stage and it is exposed to light longer. The 3 varieties of hemp planted in the same period have the same amount of important substances. And in the case study of the relationship for the quantity of important substances with planting areas above different sea levels, by comparing the amount of both THC and CBD for hemp planted at the tall tropical plants center and at the Ban Rom Klao Club during June, it is found that the THC and CBD content of the 3 varieties of in both areas are not significantly different at level value of 0.05. And in the case study of hemp planting using local wisdom, it is found that most of the first generation hemp is planted during April - May and fibers are harvested at the age of about 70-75 days, and the second generation is planted in July or August. Each generation is usually planted in many fields nearby. The analysis results indicate that both THC and CBD content increases as the hemp grows older. This is because the THC content of the surveyed hemp samples is relatively high and very different in each area due to the different terrain including genetic factors.

In addition, since the climate in Thailand is quite hot causing the THC amount of hemp to be quite high but when comparing to the THC content of marijuana, it is clearly different.In the case of growth variable data, it is found that 2 varieties of Hemp Huai Mae Kieang and Phop Phra planted at Ban Rom Klao Plant Center have the height and diameter less than the hemp planted at the tropical vegetation center and at the Huai Tad nursery planting house. This may be due to soil conditions in the planting area which is sandy loose soil, containing low mineral nutrients and it is a continuous growing area of hemp for many years causing the soil

to lack fertility. While the 3 varieties of hemp including Huay Mae Kieang, Phop Phra and Pang Ung varieties planted at the Queen Sirikit Botanical Garden, it is found that the duration of planting affects the growth since hemp is a Short-Day Plant, planting during the short days will cause the plant to bloom early, resulting in reduced trunk growth. From all the case studies above, it can be concluded that the characteristics, composition, and compounds used in hemp and marijuana grown in different geographic conditions are compared for the number of important substances to select varieties that offer less narcotic substance but high yields. And it is found that the height of the area has no effect on the THC and CBD content but on the growth of the hemp and marijuana plants. Planting during the drought season in March - April with a good irrigation system will result in high growth and productivity. While the proper amount of rainfall that is not too high will cause a high THC content (Suraphon Nathakarnkitkun, 2009).

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