The Impact of Pepper Production on Malaysian Economic and the Need for Nutraceutical Diversification

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Abstract—Pepper is an important agricultural crop with nutritional, economical and medicinal benefits. Malaysian being the fifth largest producer of pepper has experience a decline in the price and economic value of the product. Owning this decline needs then arise for the diversification of pepper products into other by-products in order to increasing the economic potential of Malaysia. This necessitated research into the extraction of bioactive compounds embedded in pepper and help on harnessing the medicinal and economic value of this essential commodity. This review elucidated the historical evolution of pepper production in Malaysia,the regulation of its marketing and its potential for medicinal diversification.

Keywords— Pepper, Bioactive Extract, Malaysia, Medicinal, Neutraceutic

1. INTRODUCTION

The large scale cultivation of pepper in Malaysia began in Sarawak in 1876 with the Chinese migrant allowed to take up large acreage of land for the large production of pepper. During this period there was a significant increase in the economic value of pepper, as a result of this, a bilateral trade was established with the Japanese in 1928[1], [2]. A research laboratory was also set up in 1956 in order to reduce the disease which could caused an extensive damage to pepper production and this marked the emergence of research facilities still existing till today[3].Black and white pepper for example was brought into Malaysia presumably by the European pioneers amid the mid seventeenth century. Be that as it may, no doubt pepper would have come to Malaysia much prior amid the fourteenth century through the Chinese broker Zheng who sorted out a progression of endeavors to the Malabar Coast touching numerous ocean coasts in between. In Malaysia, pepper development is moved in Sarawak. Here pepper production was in the hands of Chinese farmers and this lead to innovation which sky-rocketed Sarawak into accomplishing high efficiency and a boom in Malaysian economy. During this era some pepper varieties were also cultivated in other part of Malaysian, particularly in the Johor and Kato district [4].

2. REGULATION OF PEPPER MARKETING IN MALAYSIA

Malaysian Pepper Board (MPB) is a government statutory body under the Ministry of Plantation Industries and Commodities of Malaysia, instituted on first January 2007 under the Malaysian Pepper Board Act 2006.The head office is situated at Kuching, with nine branches in Sarawak and two territorial workplaces in Johor and Kota. The Board is in charge of the advancement of the Malaysian Pepper Industry in area of cultivation, advertising, research and development [5].

The Pepper Marketing Board is therefore responsible for the regulation and purchase of pepper in Malaysia[5]. They do this by purchasing from the farmers at a fare price proportionate to the prevalent market condition. And this is done in order to provide a great return for the farmer's labour and stabilize the market forces hence making the produce accessible for an onward marketing to other neighbouring countries. A storage declaration certificates are presented to the farmers, this acts as collateral

by the person who owns the pepper in the storage facilities. The farmer who hold supplies of pepper are therefore helped with discovering markets through an arrangement of offering pepper prepared for shipment to exporters.

The Board additionally takes charge of the authorization and licensing to middle men who trade in pepper in order to maintain market advancement and improvement of new pepper-based items. Under the authorization scheme, all middle men who exchange pepper are required to get a permit issued by the Board and to conform to particular conditions. These incorporate the utilization of procurement receipts to prove all buys, utilization of confirmed weighing scales, showcasing of costs at the premises of the licensee, and prompt installments for all buys. Capacity ranges are assessed once in a while and exporters are required to keep up least a required levels of cleanliness [4].

3. EVALUATION OF PEPPER PRODUCTION TO MALAYSIAN ECONOMY

Sarawak is the largest state in Malaysia producing about 14,903tonnes of pepper valued at RM287.4million in 2011 alone [6][7] This placed Malaysia as the fifth largest producer of pepper in the whole world with Indian being the largest producer [8]. [6] supported this and reported that in year 2011 the about 20 percent of Sarawak pepper was exported to Japan, 17 percent to Peninsular Malaysia, 13 percent to Taiwan, 10 per cent to South Korea, 8 percent to Singapore and 7 percent to China.

This is due to Sarawak market conforming in terms of quality with the world standard. In Malaysia, the pepper industry contributes substantially to the local socioeconomic situation. Around 45,000 farming families and more than 115,000 workers are involved in the pepper industry [9]. The crop has generated about a third of Sarawak's agriculture export earnings since the year 1990.This has improve the export potential of Malaysia to grow with over 27% of its pepper exported to North America and 1% least value to some African countries as shown in Fig.1.

Mulling over the fast advancement in Malaysia in which more than 95 percent of its pepper cultivated in Sarawak while the remaining 5 percent comes from Sabah and Johor [10]. The expanding expense on labour cost and competition from other farming and non-farming activities shows that pepper production in Malaysia is decreasing progressively. An aggregate of 22,731tons of high quality pepper were exported in 2000 alone with the exportation reaching an all high value in 2001 with about 25,406 tons [4]. There is therefore a corresponding increase in the tonnes of pepper exported from year 1998 to 2001 but the export experienced a decline from 25,406tons in 2001, to an all low value of 18,206tons in 2004.Despite an increase in the acreage of land allocated, the export value remains at low ebb from 10,400 ha in 1998 to 13,000ha in 2004 as shown in Table 1.

The worldwide production of pepper in 2013 was forecasted to peak at 314,500 tons while its utilization is relied upon to increment of 358,000 ton. As indicated by an investigation by the International Pepper Community, worldwide supply of pepper has it is right now having a shortage of 43,500 tons. Thus, the worldwide cost of pepper is required to stay stable, in the long term. The production and export patterns of pepper in Sarawak is therefore connected to the cost variance, in which there is an expanded production and recuperation from decline appears to be moderate in prospective.

The export projection of pepper for the year 2020 was estimated to be about 290,000 tonnes while the domestic consumption was forecasted to be about 270,000 tonnes.

[11] Reported that with 20,000 tonnes of pepper exported in 2007, Malaysia's offer of the aggregate world pepper production had experienced a decline to around 7.38%. And owning to a decline in the price and economic value of this pepper, there is therefore a need for diversification of the product into other by-product that will increase the economic base of Malaysia[12]. This necessitated research into the extraction of bioactive compounds in the pepper to help harness the medicinal and economic value of this essential commodity.

4. MEDICINAL BENEFITS OF BIOACTIVE EXTRACT PEPPER AND THE NEED FOR DIVERSIFICATION

Pepper is therefore an important agricultural crop with economical, nutritional and health benefits, used as spices in food industry, traditional medicine as anti-rheumatic, agricultural industry, pharmaceuticals as an analgesic, essential balm production as an adiabatic substance, and also as tear gas components in policing(defense) [13]–[15].

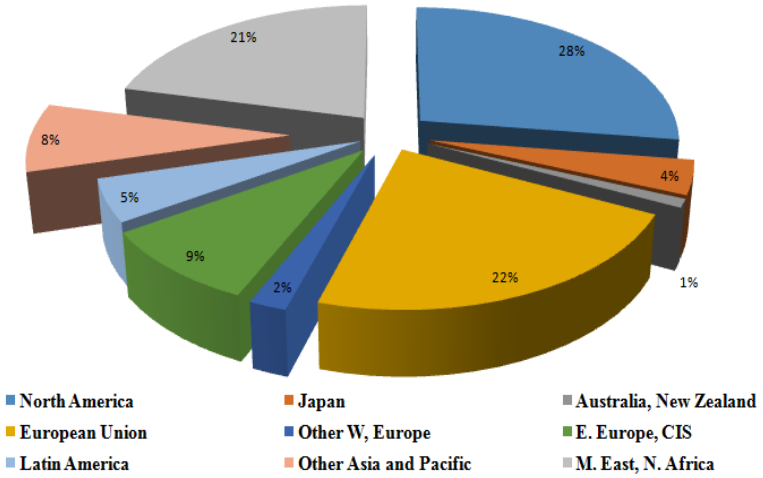

Figure 1: Export Overview of Malaysian Pepper

Table1. The Malaysian Pepper Acreage, Production and Export Record (1998-2004)

Year	Area(ha)	Production (tons)	Export(tons)	Export Value (US '000)
1998	10,400	19,000	18,669	94,834
1999	10,900	21,500	21,653	106,788
2000	11,400	24,000	22,731	94,647
2001	11,600	27,000	25,406	43,058
2002	13,100	24,000	22,642	37,914
2003	13,000	21,000	18,530	31,580
2004	13,000	20,000	18,206	29,700

Source: (1) Agricultural Statistics, Department of Agriculture, Sarawak;
(2) Pepper Marketing Board (3) Statistics Department.

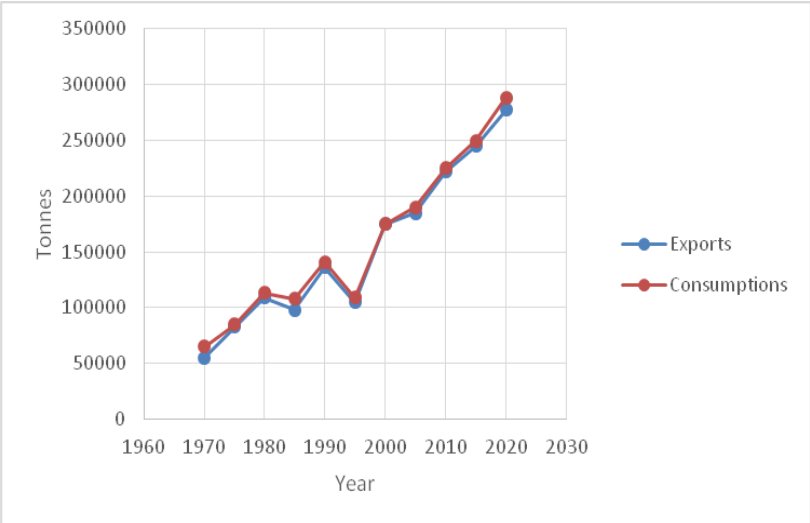

Figure 3: Projected export and consumption of pepper in Malaysia for year 2020

This benefit is due to the presence of significant quantities of different varieties of carotenoids, vitamins, minerals, and phenolic compounds with antioxidant characteristics [16]. Its nutritional quality, pungency, aroma and colour make them good food additives. Also, besides its use as food additives, capsaicin has also gotten clinical use in pharmaceutical industry and is often regarded as an analgesic substance (in surgery). Due to its ability to suppress pain without necessarily inhibiting brain responses it is considered as a potential replacement for traditional anesthesia which has the disadvantages of different health risks, such as blockage in the nerve impulses, sore throat, vomiting after surgery, teeth damage, shivering and other side effects [17]. Several researchers had worked on the anti-inflammatory activity of pepper. According to [18], Piperine showed a significant

inhibition of increase in oedema volumein a carragenin induced test at an oral dose of 50 mg/kg body weight. Another group studied on effect of piperine on oral bioavailability of ampicillin and norfloxacin [19] and they found that co-administration of Piperine (20mg/kg), an alkaloid from Piper nigrum L. enhanced oral bioavailability of Ampicillin and Norfloxacin in animal model.

[20], in his investigation elucidated the therapeutic remedies when used in small quantities for various ailments such as sore throats, asthma, coughs, toothaches reliever, balm production to assuage pain, shingles, rheumatism and arthritis and its anti-bacterial can also not be overemphasized. [21], also reported the use of capsaicin in the treatment of arthritis, rheumatism, stomach aches, skin rashes, and snake bites. This was supported by [22], who recorded the use of some notable capsicum species as anti-mutagenic, diabetic neuropathy, post-herpetic neuralgia and anti-tumor agent. [23], in investigated the clinical application of capsaicinoids in the extensive management of a number of sensory nerve fiber disorders, such as cystitis and human immunodeficiency virus (HIV).

Researchers have worked on the extract from pepper and it has been discovered that it possesses the drug ability in increasing digestive power, treatment to cold, cough, dyspnoea, intermittent fever, diseases of the throat, colic, dysentery, worms and piles; likewise, it can be used in the treatment of tooth ache, inflammation, liver and muscular pains, epileptic fits and leucoderma [24]–[27]. According to [28], black pepper is called *maricha* or *marica* in Sanskrit, indicating its property to dispel poison like snake and scorpion bites.

Pepper is also used the Indian system of medicine or as an ingredient in many formulations. The above mentioned activities may be attributed to piperine and other phenolic amides and essential oil constituents in pepper. Piperine is the major alkaloidal constituent of pepper [28]. Systematic pharmacological studies on piperine have shown its analgesic (alleviate pain), antipyretic (reduces fever), anti-nflammatory (reduces painful swelling caused by tissue injury) and central nervous system depressant activities [18]. The essential oil constituents from the extraction are mainly responsible for the antimicrobial actions [29].

Researchers had investigated the mutagenic and carcinogenic activities of pepper which gave encouraging results on its beneficial effects. It was found to be non-mutagenic by Ames test [30]. Non-mutagenicity of capsaicin in albino mice was first shown by Muralidhara (1988) upon intra-peritoneal administration of pure capsaicin at doses up to 1.6 mg/kg (one-fifth of the LD_{50}). However, studies with pepper extracts showed an increased incidence of tumour in mice and, an elevated level of DNA damage caused by Piperine in cell culture investigations. Hexane, water and alcohol extracts of pepper were tested for mutagenicity on *Salmonella typhimurium* strains TA 98 and TA 100 by Ames assay and the results indicated the non-mutagenic effects of the extracts. In another study spices like black pepper (P. nigrum), pippali (P. longum), ginger (Z. officinale) and mustard (B. nigra) increased the number of revertants in S. Typhimurium strains indicating their mutagenic potential [31].

Medicinal importance of many plants has drawn the attention of researchers to focus on unveiling their therapeutic potentials. According to an estimate, 25% of the commonly used medicines contain compounds isolated from plants [32] and according to World Health Organization (Quek), many plants in the world have been discovered to have high medicinal values.

Based on a survey conducted by the Forest Research and Institute Malaysia (FRIM) in 2012, households in Malaysia consuming herbal products were estimated to be 73% [33], which is lower compared to 80% estimate by the WHO for developing countries. Hence the need for the diversification of pepper to meet the medicinal need and improve the Malaysian economic base.

5. CONCLUSION

The medicinal value of pepper had being of concern for research over the years and this is due to its potency as an antioxidant,antimicrobial,antidepressant andanalgesic potential.The need then arise to find a way of extracting the bioactive compounds from this important crops and explore it in solving the health related problems rampant in the world. Therefore a need for diversification of the pepper product into other by-product that will increase the economic and medicinal base of Malaysia.

6. ACKNOWLEDGEMENT

I wish to appreciate my supervisor, Prof. Abdurahman Hamid Nour for his unrelenting effort in making this review a success. I also acknowledge the financial support from the Doctoral Scholarship Scheme of the Malaysian Ministry of Education (MOE) through the Universiti Malaysia Pahang (UMP), Malaysia.

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