

Keynote Speech

Technology innovation towards accelerated growth and transformation of spice sector in Sri Lanka

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Abstract

Sri Lanka has a long history of spice gardening and product export, extending up to the antiquity of the civilization. During and after the British Colonial era, prominence of spice exports shifted to plantation crops (tea, rubber and coconut). At Present spice exports increase due to elevated demand, and emerging new thinking on natural products. Spices and essential oils are widely invaded the industries related to food, culinary, pharmaceuticals, nutraceuticals cosmetics etc. In order to keep up with the current export demand, production levels of spice crops are to be increased to meet the market needs through technology incorporation, product diversification and new market attracts. The sector needs a new platform for technology innovation and transformation, mixing traditional and modern to get the market dominance and competitive advantage.

Keywords: Spice, Cinnamon, Innovation platform, Technology transfer, Green economy

Introduction

Sri Lanka with its cutting edge program "Sri Lanka Next, A Blue Green Era" intends to follow concept of Eco Village Development (EVD), which has been presented to the 5th Asia Pacific Adaptation Network (APAN) concluded on 19th Oct. 2016 where low carbon emission is selected as a development strategy. The concept can generate improved Agric. productivity, diversify livelihood, generate employment, provide affordable safe clean energy for lighting and cooking etc. (Sustainable Energy news, 2016)

Being a source as well as a sink of greenhouse gases and a victim of the global warming agriculture and forestry play a vital and unique role in the global warming scenario.

The adaptive capacity of the farming communities (Resilience), to buffer these events depends on the social structure, culture, economic capacity, and level of environmental degradation, biodiversity conservation natural resource management, coastal zone management etc. (Rosa Miki et al., 2013)

Challenges faced by the agriculture sector of Sri Lanka, in the new millennium due to climate change and environment degradation are closely linked to the consequences of the industrial economy. The unique role of the spice sector which can help to reorient the Sri Lankan economy towards environmental and green economic pathway is discussed in this paper.

History of Spices is fascinating and goes back to Antiquity of the civilization. Egyptian Queen Hatshepsut (around 1500 BC), sent out an

expedition of five ships to bring spice and aromatics from the land of "Punt" (which was believed to have been the land on either side of the lower Red Sea and Gulf of Eden) (Wejesekara, 1975). Cinnamon and Garcinia formed the ingredients of the embalming mixture in ancient Egypt. Cinnamon was among the most expensive material in ancient Greece and Rome; only royalty could afford it. Once it was more valuable than gold, and it was among the most valuable medicinal plants for ancient Greeks and Romans. Cinnamon - the most sought-after spice in the global explorations in sixteenth century. Europeans reached Sri Lanka replacing the Arabs, to grab entire cinnamon market over the world. If not for Cinnamon, voyages of Cristopher Columbus may have not discovered the new world (Wijesekera et al., 1975; Weerasekara, 2012, 2013, 2014, 2015).

The Industrial Revolution happened in 16th Century changed the pattern of feudal structures. People began to burn fossil carbon, especially coal from the beginning of the industrial age. The emergence of great factories and consumption of immense quantities of coal and other fossil fuels gave rise to accelerated development of capitalist mode of production and capital accumulation in industrially developed countries. This created a clear division between rich countries and poor countries. The former got control over many countries in Asia, Africa and Latin America (Barrios, 2007).

Colonial period begun in Sri Lanka in 1506 with the arrival of the Portuguese to the Island. They forced the Sinhala kings to undertake the supply

of about 11,000 kg of cinnamon bark annually. Then Dutch arrived Asia replacing Portuguese, and got hold the entire spice sector. Dutch reorganized and developed cinnamon trade very systematic manner. They introduced planned system of cultivation in 1767. Large quantities of cinnamon bark products reported to be destroyed by them to maintain the high price; They also activated the cinnamon oil distillation. During 16-18th centuries spices from the spice gardens of Sri Lanka were the main trade, over which long and costly wars were fought. (<http://www.agri.ruh.ac.lk/Departments/Engineering/cinnamon/>)

The colonialism leads to embark entire world in to two world wars in 1914-1918 and 1939-1945. Two world wars have neglected the environmental thinking that people in the oriental world resulting catastrophic separations of man from the environment. Once the process of industrialization began in Southeast Asia, forests which have been considered as sacred and life-giving source turned to be a fuel-giving physical source.

By the end of the 2nd world war (1945) environmental efforts of the world focused more personal issues like food safety, or consumer products, conservation of lands, etc. Consumerism was dominant in thinking pattern, rather than the natural services provided by the environment to protect the life on earth. This leads to the environmental degradation and global warming which are then leading to escalation of disasters.

In the turn of the century carbon emission by petroleum, coal, natural gas etc. exceeded 8000 million metric tons (Shiv Kumar et al., 2014). The environmental degradation and global warming opened up a new dialogue in terms of green and green movements. The rise of the modern green movements took place in late 1960 and 1970. The book by Richard Carson 1962 catalogued the environmental impacts of the indiscriminate spraying of DDT in the US and questioned the logic of releasing large amounts of chemicals into the environment without fully understanding their effects on ecology or human health (Carson Rachel, 1962).

It has been now realized that industrial economy, emerged after the industrial revolution, is geared mainly towards man centered development (improving human welfare), primarily through increasing the consumption of goods and services, from the environment without giving much attention on its sustainability.

If any development act, doesn't balance on the three pillars (environment, economy and society), that will definitely derail the concept of sustainability. Thus creation of a viable economy, bearable environment, and equitable society are the only basis to gain the sustainability. In June 2009 at the UN climate change conference held in Copenhagen, Green economy has been identified as a transformation mechanism to address the multiple crises facing by the humanity. Since then Green economy, Green growth and Low carbon development have been identified as the trusted path ways to achieve environmental sustainability and sustainable development in the new millennium.

Role play by Spices in Green growth programs of the new millennium

Spice crops (Cinnamon, Pepper, Cardamom, Nutmeg, etc.) are perennials, with less demand for carbon and water. They are eco-friendly plants; suitable in crop associations which are rich socio ecological systems are grown by large number of environmental sensitive small holders (about 100000 families). Cinnamon as a major spice crop has been successful in many agro ecological zones to reclaim the marginal lands of tea plantations.

Today major development centres shifted to Asian region and countries like China, India, Korea, Japan emerging as economic giants. Therefore, most of the traditional knowledge and social systems such as Ayurveda, Aroma Therapy, Yoga for mental and physical health, ethical foods, traditional menus, mental sensation etc. which have been masked by the western culture, are getting deeper rooting. Therefore, world markets for spices and culinary herbs getting large, and valued at just over US\$ 2.3 billion. Low developed countries (LDCs) such as Madagascar, Comoros and the United Republic of Tanzania earn a substantial part of their foreign exchange from spice exports.

Sri Lanka getting 3% of the Export earnings, after Textile (43 %), Tea (15 %) Rubber (9%) Coconut (4 %), from the spice sector. USA, UK, India, Italy, Belgium, Germany, Russia, UAE, Japan, UAR are the major markets for Sri Lankan spices. Local indigenous medicine, get prominence even by acquiring the concepts and knowledge of the new domains of Bio and Nano technologies.

According the data gathered by Department of Export Agriculture (DEA), (2015), the export earnings of the spices are getting into an accelerated phase during the last ten years hitting the target of 50000 million Rupees and 48000 Metric tons in the year 2013. Cinnamon,

Pepper, Mace, Cloves, Vanilla, Nutmeg, Areccanuts, Betel, Citronella have performed extremely well to add to the above export revenues while keeping the 80% share on cinnamon.

The Existing favourable economic environment in Sri Lanka helps the DEA to vision out Sri Lanka as the spice hub of Asia. In the ten-year development plan for the spice and allied crops sector in Sri Lanka, Ministry of Primary industries set a goal to increase the contribution of Spice Crops to GDP, from 0.6 to 6 %. The moto and approaches, identified in the ten-year plan is the repositioning of Sri Lankan spices in the Global spice market as a super food and super ingredient through a paradigm shift, by embracing, innovations, scientific knowledge, appropriate technology and developing value chains (2015-2025 Spice sector Development plan)

Cinnamon quill process technology

Department of Agric. Engineering, University of Ruhuna, initiated technology incorporation and improvement programs in 1995, for cinnamon. Technology development demonstrated that the technology incorporation as a major path to revitalize the cinnamon industry. In 1995 Department patented a prototype machine, based on spring loaded mechanism (RUWEKA-CG) (Weerasinghe *et al.*, 1999) for cinnamon rubbing to increase the process efficiency by 59.7 %. The device was further improved with the addition of a poly cam mechanism (RUWEKA-PG) to facilitate the inserting process of the cinnamon sticks (patent A23N 7/10, 11/00B27) 3/00G05G17/00.). In November 2005, a new industrial design of a cinnamon processing bench was registered (Pushpitha, 2006). Currently cinnamon quill making table and Katta peeling device are in the pipeline for patenting (<http://www.agri.ruh.ac.lk/Departments/Engineering/cinnamon/Cin%20stat.htm>)

These technologies were slowly diffused to "U 10" GTZ supported processing units, and Eastern pharmaceutical company, in Kirinda. But so far technology has not got the anticipated momentum to impact the change process.

Based on these studies future manpower need for mechanized cinnamon sector has been researched and results were documented in the vocational Education plan (2011). There is a ADB and world bank proposals to support the spice industry for its skill development (10 year ADB, Skills Development plan). The ministry of Primary industries (MOPI) through these experiences take up the measures to accelerate

the Cinnamon Research and Development program catalysing the formation of innovation platforms by rallying all the stakeholders (Privet sector, Industry, Academia, Policy makers). MOPI and NSF also initiated a Model Research Innovation program in 2016 rallying all the leading researchers in Academia and industries.

New Market demands

It is worth noting the emerging new food concepts and products in food industries, which mainly focus on beneficial effects of food on brain performance and memory. Influence performances of the brain important during demanding mental tasks like decision-making and intensive learning. Therefore, food industries are targeting to enhance brain performances during events linked to mental stress such as examinations, interviews where spices will play a vital role. These concepts have been deep rooted in traditional Ayurveda systems. Some of the modern market invasion of Aroma therapy and Yoga visions demand more and more research in spice sector which needs special attention. There are 8 different aroma families such as Citrus, Floral, Spicy etc. This classification based on the distinct differences in their fragrance and properties. Since Aroma therapy and Yoga practices are now progressing as relieving technology to maintain mental and physical balance of the body, more converging research are to be commenced. As expressed by Indian Prime minister Mody, "changing lifestyle and creating consciousness, help us to deal with climate change". Thus Spices, Aroma therapy and Yoga are green measures, can make impact on Climate Change and switch into Green economy and green pathway of life. Ruhuna University has commenced undergraduate and post graduate programs on "Green technology" in 2012 to create intellectuals for tomorrow to work on above lines. The graduates of the Green Technology program will be able to win over the battle between the old and the new, that is, between the path dependence forces of the old and creators of the new paths.

Conclusions

Traditional knowledge accumulated in the spice sector of Sri Lanka, for centuries opens up new pathways to emerge in to the Knowledge based Bio Economy. However, spice sector needs technology innovation, to increase the product efficiency to tap the expanding world market. The machineries and equipment so far developed for cinnamon processing needs to undergo further industrial testing and market research to get the competitive advantage in newly emerging markets.

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