THE HYBRID CHILLI SEED PRODUCTION IN SRI LANKA THROUGH UNIVERSITY ENTERPRISE COLLABORATION (UEC) AND FARMER CLUSTERING APPROACH

MDN. Gunaratne[1*], KDN. Weerasinghe[2]
[1]Institute of Applied Statistics Sri Lanka
[2]Faculty of Agriculture, University of Ruhuna, and Horizon Campus, Sri Lanka

[*]mdng2012@gmail.com

1. INTRODUCTION

Agriculture in the 21st Century is in a crossroad to feed the population of 9.1 billion people in 2050. This requests the adaptation of sustainable food production measures while combatting the millennium challenges of climate change and global pandemic, for which estimated annual investment is around 80 billion US $ (FAO, 2009). As emphasized in the recently concluded Glasgow summit of world leaders, the global warming is being faster since the 1980s, (Union of Concerned Scientists, 2019) and strong measures are to be adapted to maintain temperature increase below 1.5^0 C by 2030, to avoid the serious threat lie on nature. If the global warming linked to climate change is failed to be maintained it will directly influence agricultural productivity, hydrologic balances, input supplies and many other components of agricultural systems (Adams, 1998), by impacting on weather, yields, prices, government policies, global markets, food security and many more. Crop growth simulation shows that rice yield decreases by 9% for each unit increase of seasonal average temperature (Sombroek and Bazzaz, 1996). Therefore, adaptation of climate risk mitigation is an important urgent measure for Sri Lanka being a less developed small Island, which is likely to be severely affected by climate change (Seo et al., 2005).

Even the Agriculture contributes only 8% (in 2020) of GDP to the country, it is the vital source of employment for most of the Sri Lankan workforce, contributing to 25% of the total employment (Central Bank of Sri Lanka, 2020). Further, the sustainability of agriculture is important for food security and the stability of many Industrial Exports. On the other hand, Sri Lanka needs accelerated growth to meet consumer demand and to alleviate rural poverty. Therefore, agricultural investment is an important and effective strategy for the sustainable development of the country.

In this endeavor Protected agriculture provides a promising way forward to modify the growing environment to meet the challenges of climate change by creating a favorable control environment to cultivate high-yielding crops varieties, hybrids etc.

The World Bank-funded project on Agriculture Sector Modernization (ASMP) (Value Chain Development) under the State Ministry of Development of Minor Crops Plantation including Sugarcane, Maize, Cashew, Pepper, Cinnamon, Cloves, Betel Related Industries, and Export Promotion has promoted this technology among the farmer communities since 2020, to assist the local chili production through hybrid seed production in protected houses. The project aiming to reduce the Importation of dry Chili to Sri Lanka, to reduce import-export deficit of US$ 6 billion (in 2020) and the current paper demonstrates the results of the pilot project initiated by the AASMP in Central province.

2. METHODS

The program created clusters of 185 farmers in Welimada, Bandarawela, Nuwaraeliya, Badulla, and Kandy area by providing affordable automated protected agaric systems which an objective to intensify the production to double or treble the productivity while saving water nutrients and high chemical inputs for pest and disease control incurred in conventional agriculture. The research basis for the creation of automated polytunnels for small farmers was developed through a collaborative program with the Dialog Axiata program along with the Universities of Ruhuna and Moratuwa, the graduate company "Plant Tip" has been created by the program supported by the Dialog to disseminate the research outputs. The ASMP helps to create the innovation platform by clustering the small farmers providing partial financial assistance of 50-60 % of project costs to industrialize the research outputs.

3. RESULTS AND DISCUSSION

The annual requirement of dried Chilli for local consumption is estimated to be around 60,000 mt per annum: out of which only 7,500 mt has been locally produced and the balance 52,500 mt has been imported by expending Rs 14,500 Mn. (Around US$ 72.5 Mn). The yield of the existing chili varieties is low and varies from 4.7- 5.8 mt/ ha whereas the yield of the improved variety of MICH-HY1 by the Department of Agriculture is around 32 mt/ ha. The main reason for the low productivity is due to the low yielding potential of the existing varieties, which are also susceptible to pests and diseases. Poor management of cultivation is also contribut to the low yields. Therefore, the Department of Agriculture planned to extend Hybrid chilli cultivation in an additional 10,000 ha by 2024 and the total estimated hybrid (MICH-HY1) seed, is around 5,000 kg per annum. The Department has developed a hybrid variety MICH-HY1 which has a yield potential of 32 mt/ ha (Chilli, 2015). ASMP took the initiative to undertake a Hybridization program of the above variety by introducing a poly tunnel clustering program.

ASMP program helps the farmers to initiate Commercial level chili hybrid seed production by encouraging leverage investments from farmer producer organizations and agribusinesses, to produce high-quality seeds by providing the enabling environment, incentives, and access to finance for such investments through matching grants, technical assistance support. By now around 25-30 number of farmers have completed 1st cycle of production. Even though the process of construction of polytunnels was affected by consequences of COVID-19 pandemic, elevated prices of materials due to restrictions of import and shipping disruptions, as well as shortages of materials the project activities were somewhat retarded and now it is getting into accelerated phase.

In summary, the expected increase of Hybrid chilli seed production would be around 1,850 kg by 2024 and it would be 37% contribution of the required seeds for cultivating an additional 10,000 has in Sri Lanka. The expected outcome of the chili seeds through this program is given in the table (Table1) below.

Table 01: Expected outcome of the polytonal project

	Year		
	2022	**2023**	**2024**
Expected Production of Chilli Seeds through the Project (kg/annum)	1,000	1,395	1,863
Estimated Hybrid seed requirement for proposed cultivated area (kg/annum)	3,000	4,000	5,000
Contribution of the project for Hybrid seed production	33%	35%	37%
New Employment Generation	375	450	561
Expected Increase in Fresh Chilli Production (tons)	13,600	18,972	25,337
Expected Increase in Dried Chilli Production (tons)	3,400	4,743	6,334
Expected Foreign Exchange Saving due to increased Chilli Production by the Project (US$ Mn/ annum)	7	10	14

4. CONCLUSIONS

A pilot scale University Industry collaboration project commenced by the Agriculture Sector Modernization Project along with Dialog Axiata, Dept. of Agriculture , Universities of Ruhuna and Moratuwa and start up graduate company "Plant Beat ' to introduce outcomes of the research inventions in hybrid Chili seed production in automated protected poly tunnels through farmer clustering approach demonstrated to be a promising methodology to meet the challenges of the climate change.

5. ACKNOWLEDGMENT

The authors wish to acknowledge the Agriculture Sector Modernization Project, for providing facts and figures for this study.

REFERENCES

Adams, R., Hurd, B., Lenhart, S. and Leary, N. (1998). Effects of global climate change on world agriculture: an interpretive review. *Climate Research*, 11, pp.19-30.

Central bank of Sri Lanka, 2020. *Annual Report of The Central Bank*. (2020). Colombo: The Central Bank of Sri Lanka, pp.Annex 1 - 6, 48.

Seo, S., Mendelsohn, R. and Munasinghe, M., (2005). Climate change and agriculture in Sri Lanka: a Ricardian valuation. *Environment and Development Economics*, [online] 10(5), pp.581-596. Available at: <https://www.cambridge.org/core/journals/environment-and-development-economics/article/climate-change-and-agriculture-in-sri-lanka-a-ricardian-valuation/7A2F60EF9CE85106D027FDBADCD45020>.

Sombroek, W. and Bazzaz, F. (1996). *Global climatic change and agricultural production*. Chichester: Food and Agriculture Organization of the United Nations, p.136.

Union of Concerned Scientists. (2019). *The Planet's Temperature is Rising*. [Online] Available at: https://www.ucsusa.org/resources/planets-temperature-rising [Accessed 24 Dec. 2019].