INTERNATIONAL CONFERENCE ON ADVANCES IN TECHNOLOGY AND COMPUTING (ICATC-2021)
Faculty of Computing and Technology (FCT), University of Kelaniya, Sri Lanka
18th December 2021

Index No: ES-20-61

Agricultural Call Centres: An Overview Of 1920 Agricultural Advisory Service Usage, Sri Lanka

Sanduni Rathnayake (1st Author)
Department of Agricultural Extension
University of Peradeniya
Peradeniya, Sri Lanka
sandunianu@agri.pdn.ac.lk

T.A. Kamiss (2nd Author)
Department of Agriculture
National Agricultural Information Communication Centre
Peradeniya, Sri Lanka
kamiss.doa@gmail.com

U.I. Dissanayeke (3rd Author)
Department of Agricultural Extension
University of Peradeniya
Peradeniya, Sri Lanka
uvasarad@gmail.com

P.C.B. Alahakoon (4thAuthor)
Department of Agricultural Extension
University of Peradeniya
Peradeniya, Sri Lanka
prasad_uop@yahoo.com

M.F.M. Rizwan (5th Author)
Department of Agriculture
National Agricultural Information Communication Centre
Peradeniya, Sri Lanka
rizwan.doa@gmail.com

***Abstract* — The 1920 Agricultural Advisory Service (AAS) was introduced in 2006, as an ICT initiative of agricultural extension in Sri Lanka. There are no studies assessing the long-term usage of AAS by the community. Therefore, secondary research was carried out to identify the trends and patterns in 1920 AAS usage. Data were collected from internal databases, records, seasonal reports of National Agriculture Information and Communication Centre (NAICC), journal articles and web sources. Results revealed an increasing trend of receiving queries from 2006 to 2012 and, from 2016 to 2018. The trend was decreasing from 2012 to 2015. By the end of 2018, AAS has received 546,473 queries since its inception. Queries on fruits, vegetables and subject-specific matters have been highest for several years. The highest number of queries was regarding 'cultivation' matters and queries from Colombo district was the highest in every year. There was no seasonal variation of the total number of queries received. Peak hours of AAS were from 8.00 am to 10.00 am where it served 31.6% of the total queries received per month. This study revealed several avenues for primary research. A detailed field level studies on the parameters claimed for the highest number of queries will be helpful to plan tailor-made extension programs. Mapping of queries received by AAS will provide a valuable information source for the policy makers in designing field extension programmes in Sri Lanka.**

Keywords* — *1920 Agricultural Advisory Service, Agricultural Community, Call center solutions, ICT for agriculture, Sri Lanka

I. INTRODUCTION

Rapid spread of mobile phone usage has accelerated the use of ICT in agricultural extension in developing countries [1,2]. In line with that, Call Centre models have been successfully used in offering demand driven agricultural advisory services to farmer communities [3,4]. These call centres were initiated mainly targeting small scale farmers those who had limited access to information [5,4]. Further, such centres were also helpful in supplementing the traditional extension systems which had inadequate resources to meet urgent information needs of the farmers [5]. The food crop sector in Sri Lanka employs more than 2500 field extension workers, and an individual extension worker has to serve about 3000-4000 farm families [6] which is not adequate at all. Therefore, by identifying the need of an alternative mechanism to cater farmer information needs, government interest was shifted to incorporate ICTs in agricultural extension [7]. Accordingly, Call Centre model was initiated by the Department of Agriculture, Sri Lanka (DOASL) to address day-to-day information needs of farmers [6,8].

In 2006 "Govi Sahana Sarana" was initiated by the DOASL where people can call and clarify farming related problems through a hotline 1920 [8]. The service was completely free of charge [8] and named as 1920 Toll Free Service (TFS). It operated daily from 8.00 am to 6.00 pm. Later, from 2011 onwards, callers had to bear the cost of telephoning, while the advisory service remained free of charge. From 2007 February onwards, TFS operated from 8.30 am to 4.15 pm during only weekdays. In October 2016, the location of the service was shifted to the National Agriculture Information & Communication Centre (NAICC), Gannoruwa which is the communication arm of DOASL. Simultaneously, the service was re-named as "1920 Agricultural Advisory Service" (AAS). During the study period, there were 18 call centre agents who are trained

Agricultural Instructors (AI s), attending for the telephone queries and providing required information to the callers.

According to the system plan of AAS in Fig.1, 1920 is receiving telephone calls through various service providers and those calls are connected to Public Switched Telephone Network (PSTN). Through Session Initiation Protocol (SIP trunk), calls are diverted to Call Centre server and answered by Call Centre agents. Callers also can communicate with 1920 through Facebook, WhatsApp, Imo, Skype, Viber and emailing which facilitates detailed information sharing (eg. Images). According to the DOASL, for 2006 to 2008, 40,000-50,000 queries have been annually made by clients [9]. This service became very popular as it was free of charge and delivered in local language [8]. High level of mobile phone usage by the farmers in the country to access the information [10] may also have triggered this success of AAS. There are several micro-level studies conducted on AAS at the field level [9,11]. However, there are no studies available, investigating the long-term patterns and trends in AAS use by the island wide farmer community. Therefore, this study will try to fill that research gap by identifying the trends and patterns of AAS use, for the period of 2006 to 2018. The findings of this study will be helpful to identify the real information requirement of the farmers and to plan tailor-made advisory programmes.

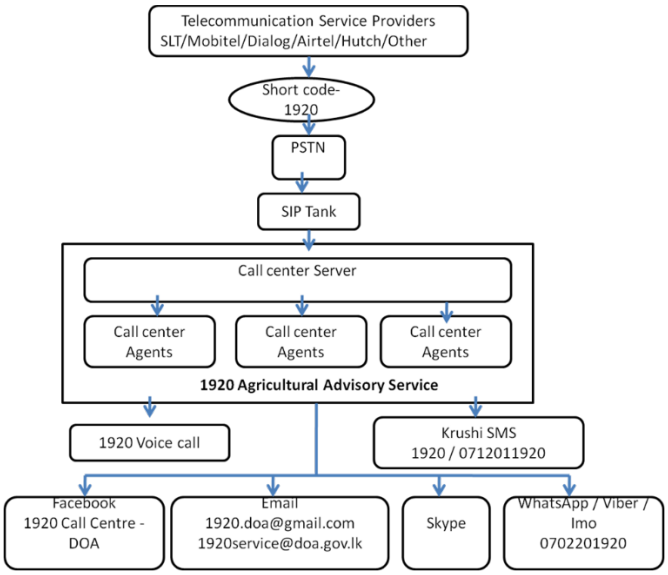

Fig. 1. System plan of 1920 AAS

II. OBJETIVES

The general objective of this secondary research is to identify trends and patterns of usage of AAS by the community in the period of 2006 to 2018.

III. METHODOLOGY

The study was conducted as a secondary research (desk research) [12,13] in 2019. Data were collected from the internal databases, records, seasonal (Yala and Maha) reports maintained by NAICC for a period of 12 years from 2006 to 2018. Annual reports, books, and web sources were also used to collect the data. Data were analyzed using MS Excel and SPSS version 16.

IV. RESULTS AND DISCUSSION

A. Trends in total number of queries received (2006-2018)

The average number of calls received during the period of 2006 to 2018 was 41,565 (Fig. 2). Based on the service demand analysis, three distinctive phases can be identified in relation to the number of calls received by the AAS by the end of 2018. The demand for AAS has changed time to time. As depicted in Fig. 2, phase I shows an increasing trend of receiving queries during the initial 6 years till 2012. In 2006, when the service was first established, the number of calls received were quite small compared to subsequent years. This was the first attempt of using mobile phones for agricultural information dissemination in Sri Lanka. Since the community was at the early stage of the adoption process, number of calls may not be very high. But, when the level of awareness is increased, people automatically started to recognize 1920 as an important information source. According to Kumari et.al. (2009), 8.8% (n=80) of the vegetable farmers in Kandy district have identified 1920 as their main information source for farming activities while 86% of contacted growers (n=50) have informed fellow farmers about 1920 [11]. Hence, awareness of 1920 AAS within the community might have been increased through fellow farmers and other sources of information. Subsequently, the number of queries received may be increasing gradually till 2012.

During phase II which lasted from 2012 to 2015, there was a decline in the number of calls received by the AAS. One possible reason for the reduced numbers would be the implementation of a cost-sharing approach in 2011, where the callers must bear the cost for the phone call. When the awareness increased about the expenses of calling to AAS, it might have decreased the service usage by the community.

In the phase III, there was an increase in number of calls during the period of 2016 to 2018 where AAS underwent various changes. The number of telephone lines and number of call agents were increased from 4 to 20 and from 6 to 18 consequently. As a result, 1920 AAS was able to accommodate more calls at a given time. A huge promotional campaign of 1920 AAS was conducted by using posters and through DOASL mass media programs. These measures resulted increased public awareness of the service. Until 2016, 1920 AAS used to be in an office area with a limited space and later, it was shifted to a new, spacious location. It reduced the external disturbances and enabled clear communication between the caller and call agent. All these strategies may have combined effect for the increase in number of calls received by 1920 AAS following the year 2015.

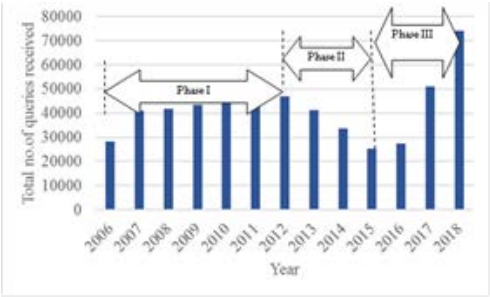

Fig. 2. Total number of queries received by 1920 AAS from 2006 - 2018

The average number of queries received during the period from 2006 to 2017 was 39,358. In 2018 alone, the AAS received 74,168 of queries which is 88.4% increase of queries compared to the average. It was the highest figure recorded in its 12 years of history. In 2018, Fall Army Worm (FAW) pest attack appeared in Maize cultivations [14] and people were educated to contact 1920, if they encounter this pest [15]. Farmers were mindful about the unidentified pests in their fields. It increased the number of calls received by AAS asking verifications about the pests they observed. This was coupled with the photo sharing through Viber and WhatsApp, which were newly added social media platforms into 1920 AAS.

The forecasting of annual number of calls using exponential smoothing method revealed that the number of calls has been steadily increasing from the inception and then there was a minor drawback (Fig. 3). Now, the service is recovering and it is heading towards a rapid increase of queries in the coming years.

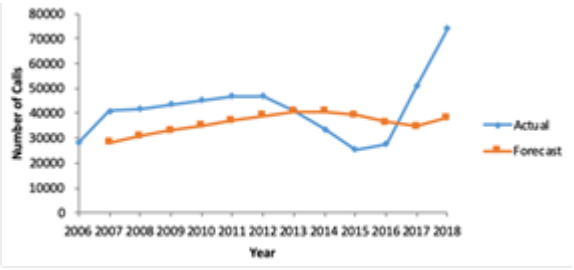

Fig. 3. Forecasting trend of total annual number of calls

B. Trends in crop categories claimed for queries:

The queries received by 1920 AAS were classified into 11 categories. DOASL is following general agricultural extension approach where it covers advisory work for a wide spectrum of crops. Therefore, the number of queries can be answered directly by the DOASL call agents, is high. The queries on other types of crops (eg. tea, coconut) or group of crops (eg. export agricultural crops) are directed to the relevant institution where necessary. It was evident that queries related to floriculture, medicinal plants, roots and tuber crops and livestock is relatively lesser than queries in other crop categories. Queries related to fruits, vegetables and subject-specific problems was the highest in several years (Table 1) covering more than one fifth of the total queries raised for corresponding year. Until 2016, the lowest number of queries had been raised regarding medicinal plants (average- 153 queries) and the queries related to livestock was the lowest from 2016 to 2019 April (average-261 queries). Exponential smoothing analysis of annual number of calls on fruits, vegetables and paddy (Fig. 4, Fig. 5, and Fig. 6 consequently) showed a similar pattern to that of the total number of annual calls (shown in the Figure 3).

Fig. 4. Forecasting the trend of annual number of calls on fruits

Table 1. Crop categories claimed for highest number of queries in each year (2006-2018).

Year	Crop category with highest number of queries	Number of queries received	Percentage out of total queries received for the corresponding year
2006	Fruits	6743	23.8
2007	Vegetables	11438	27.9
2008	Vegetables	11439	27.3
2009	Fruits	10598	24.4
2010	Fruits	12550	27.8
2011	Vegetables	11217	23.9
2012	Fruits	12809	27.3
2013	Fruits	10705	25.9
2014	Subject-specific problems	7866	23.4
2015	Subject-specific problems	6105	23.9
2016	Subject-specific problems	6691	24.2
2017	Fruits	11938	23.4
2018	Subject-specific problems	16910	22.7

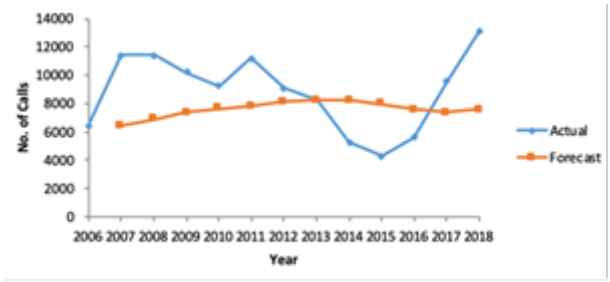

Fig. 5. Forecasting the trend of annual number of calls on vegetables

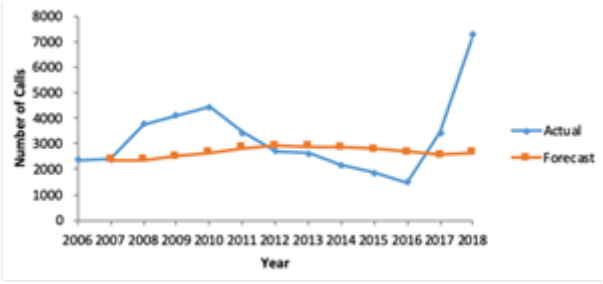

Fig. 6. Forecasting the trend of annual number of calls on Paddy

Further detailed analysis of repeatedly queried crop categories will be beneficial in developing crop-specific extension programmes

The 1920 AAS database has seasonal reports for both cultivation seasons in Sri Lanka; Yala and Maha [16]. Analysis of seasonal data applicable for 2006 to 2016 showed that, in both seasons, vegetables, fruits and subject-specific problems have claimed for the highest number of queries, interchangeably, which is similar to the findings of analysis of total number of queries received per year. Paddy is the main food crop in the country, cultivated in both seasons. Hence, the average amount of queries received on Paddy was also considered with vegetables and fruits (Table 2).

Table 2. Average amount of queries received by crop category in two seasons (2006 - 2018).

Crop category	*Maha*	*Yala*
Paddy	1790	1329
Fruits	4868	4993
Vegetables	4443	4326
Total	20,699	20,005

The total number of queries and the queries about paddy, fruits and vegetables were higher in Maha than Yala in between years 2006 to 2018 (Table 2). The Mann-Whitney U test results showed that there is no significant difference between total numbers of queries received for two seasons ($U = 63$, $p = 0.854$). There is a significant difference (α=0.10) between total numbers of queries received for two seasons about paddy ($U = 35$, $p = 0.056$). In Maha season, Paddy is cultivated in many parts in the island and in Yala it is limited mostly to the certain areas. As a result, the number of queries received in Maha is higher than in Yala season.

There is no significant difference between total numbers of queries received for two seasons about fruits ($U = 62$, $p = 0.806$) and about vegetables ($U = 61$, $p = 0.758$). It appears that the problems related to key crop categories are not much affected by the seasonal variations.

C. Trends in agronomic practices and other related information claimed for queries:

For 2006 to 2016 period, highest no. of queries has been received regarding 'cultivation' issues. According to Fig. 7, except in 2009, not much seasonal variation can be observed with respect to no. of queries related to 'cultivation'. It will be important to further study on the crop categories claimed for high amount of 'cultivation-related' information as it will indicate the real information requirement, which would help to develop crop-specific extension programmes.

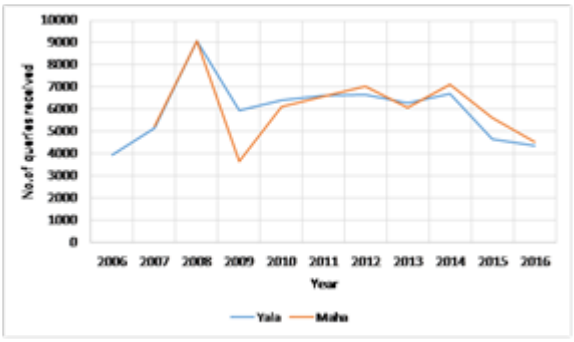

Fig.7. Seasonal variation of queries received regarding 'cultivation' issues (2006-2016).

D. Trends in geographical area claimed for queries:

According to Fig. 8, for the period of 2006 to 2016, the highest amount (14.7%) of queries have received from Colombo district (Average 5509 queries), followed by Kurunegala (11.5%) and Kandy (9.8%) districts. In 2008, there were 8778 queries from Colombo district which covered 16.7% of the total queries received and 26% of queries were related to 'subject-specific problems'. Home gardening' is also included in 'subject-specific problems' category of AAS. Part-time farming is common in Colombo district which is basically an urban area. Highest number of queries about fruits and vegetables, and higher no.of queries from Colombo district reflects that people do home gardening (where fruits and vegetables are common) as part-time or secondary activity, would contact AAS very often. However, a detailed field level study is required to validate this assumption. Reasons behind the highest number of calls from such an urban area may be due to easy access to mobile phones, lack of contacts with the field level extension officers, etc. It will be worthwhile to study whether AAS is performing far better in extension and advisory work in urban agriculture in Sri Lanka.

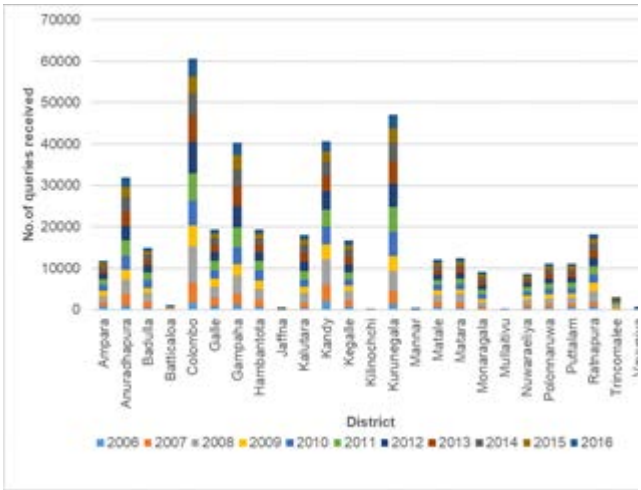

Fig. 8. Geographical variation of total no. of queries received (2006-2016)

According to the Figure 8, a lesser number of queries has been received from Mulativu (14), Mannar (28), Killinochchi (18), and Jaffna (43) districts where Tamils makes the majority of population. Lack of Tamil speaking Call Center agents in 1920 AAS to respond the queries, lack of awareness about the 1920 AAS or availability of good agricultural extension set up in the area, may also have some effect on this. Further field level study will provide more insights on how to make these 'less-active' areas more engaged with AAS.

Interestingly, Anuradhapura and Polonnaruwa districts, which are mainly Paddy cultivating areas in the country, [17] claimed for 7.7% and 2.7% of queries consequently, which is far behind the values for Colombo district. It can be assumed that AAS would not play a significant role in providing extension and advisory services to Paddy farmers. It may be due to availability of strong field level extension network at the field where no other alternative information source is needed, or lack of acceptance of new communication tools by the traditional Paddy farmers. However, a detailed field level study will be required to explain this scenario. A detail analysis on the "problematic" districts will provide a good foundation to plan "site-specific" agricultural information services.

E. Peak hours of 1920 AAS

It was observed 31.6% of the total queries received per month (average) in the period of 2017 to 2019 had been received in between 8.00am to 10.00am. Identifying these peak hours is beneficial for the decision makers in AAS to make sure that, all the call agents are at their seats during that time, to receive the call. It avoids the caller keep waiting and enable smooth functioning of the service. It will be interesting to study the relationship between the peak hours of 1920 and the types of queries raised, so that, call agent would know 'what type of queries comes in what time', in advance.

V. CONCLUSION

AAS is providing different types of agricultural information to the farmers all over country. However, in its 12 years history, there are not many studies available assessing the AAS at the field level as an ICT initiative for agricultural extension in Sri Lanka. Being secondary research, this study provides an overview of the AAS usage over the years and it bring forward some multiple avenues for primary researches [12] in different aspects which would help to plan tailor-made extension programs. Moreover, this study has identified geographical distribution of clients and queries, therefore mapping of the queries received by AAS, will be possible. Based on that, more ICT tools can be tested in high potential areas for similar purpose. It will also make a good source of information for all the personnel involved in field level extension and advisory work in Sri Lanka. Overall, this study contributes to the academic literature by producing a valuable snapshot of the AAS usage by the Sri Lankan community, as a novel ICT tool for agricultural extension.

REFERENCES

[1] Aker, J.C. 2011. Dial "A" for agriculture: a review of information and communication technologies for agricultural extension in developing countries. *Agricultural economics*, 42(6) : 631-647.

[2] Steinke, J., van Etten, J., Müller, A., Ortiz-Crespo, B., van de Gevel, J., Silvestri, S.2020. Tapping the full potential of the digital revolution for agricultural extension: an emerging innovation agenda. *International Journal of Agricultural Sustainability*, p 1-17, doi: 10.1080/14735903.2020.1738754

[3] Wen, G., Zetian, F.,, Daoliag, L., Longyong, Y., Jian, Z., Xiaoshuan, Z. 2007. Agrilnfo: An agricultural information system based on a call centre in China. *New Zealand Journal of Agricultural Research*, 50(5): 797-806

[4] Koshy, S., Husain,S., Kumar, K. 2015. Agricultural information delivery mechanism using ICT: A case study from Kerala, India. doi:10.1109/ISTAS.2015.7439413.

[5] Cole, Shawn, A., A. Nilesh Fernando. 2012. The Value of Advice: Evidence from Mobile Phone-Based Agricultural Extension. *Harvard Business School Working Paper*, no. 13–047

[6] Mudannayake, I. 2006. Forging Partnerships between Libraries and Extension Services for Improved Access to Agriculture Information: A case study in Sri Lanka. p.1-9. In Proc. *World Library and Information Congress*, 20-24 August.,2006. Seoul, Korea.

[7] Sivayoganathan, C. and Wirasinghe, S. 1992. Agriculture extension in the food crop sector of Sri Lanka: Past present and future. Jubilee year publication of the faculty of agriculture and the postgraduate institute of agriculture. p.174-195

[8] Wijekoon, R. and Rizwan, M. 2011. Cyber Extension: An ICT Initiative for Strengthening Agricultural Extension in Sri Lanka. *Success Stories on ICT/ICM in AR4D in Asia and the Pacific Region* Retreived from https://d1wqtxts1xzle7.cloudfront.net/51816419/Success_Stories_on_ICTICM_in_AR4D_in_AP_Region_2011-with-cover-page-v2.pdf?Expires=1628625987&Signature=cyzaeTuCHYSnCWyCovsYgDBKhlCtIqTFRCbHbyGt8o18RoCdHdLGz~81QartFOKXPWzgy6Od~RHw5ueL5KNFFQ9tVCn~aLZwPo-SPG-JefTCsaYw6diq2uJ~nmaTr0suQ8WixGTRFNi2fN4ux~3XYfZWy5aaN7T0S4pauG2M4tKknWO-HNloUpe0Ce~6dbpGDNjT3lJFRuJlclLcFpVzF4GE4LoPJ94rPS1KEKj-JofzrslDvaWAdhErrACOX83p0OPor0hBdXpzRMrRMIGtSUNJGd3fgnQOGzfvMRsK92ApJboWVr7fv2lGIuU5TVuwJnR1JQ9O5rM5~xY~BVh~Hw__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA#page=36

[9] Madana, M.H.B.P.H., Dissanayake, D.M.L.B. 2009. Field assessment of toll free information delivery service: Case study in Anuradhapura district of Sri Lanka. p. 341-354. In Proc. *Experiences & Challenges in Agricultural Extension: Meeting Farmer Needs*, 27-28 August., 2009. PGRC Gannoruwa, Peradeniya, Sri Lanka.

[10] Dissanayeke, U. and Wanigasundera, W. 2014. Mobile Based Information Communication Interactions among Major Agricultural

Stakeholders: Sri Lankan Experience. *The Electronic Journal on Information Systems in Developing Countries*, 60(1): 1-12

[11] Kumari, B.S.A, Sivayoganathan,C., Kumara, W.A.G.S. 2009. Effectiveness of toll free agricultural advisory service to vegetable growers in Kandy district. p.355-371. In Proc. *Experiences & Challenges in Agricultural Extension: Meeting Farmer Needs*, 27-28 August., 2009. PGRC, Gannoruwa, Peradeniya, Sri Lanka

[12] Stewart, D.W. and Kamins, M.A. 1993. Secondary research: Information sources and methods. 2nd ed. Sage,USA

[13] QuestionPro. 2021. Secondary Research- Definition, Methods and Examples.Retreived May 14,2021 from https://www.questionpro.com/blog/secondary-research/.

[14] Perera, N., Magamage, M., Kumara, A., Galahitigama, H., Dissanayake, K., Wekumbura, C. 2019. Fall Armyworm (FAW) Epidemic in Sri Lanka: Ratnapura District Perspectives. I*nternational Journal of Entomological Research*, 7(1): 9-18.

[15] Mudugamuwa, I. 2018. Battle against Sena intensifies. Daily News. Retreived May 13, 2021 from https://dailynews.lk/2018/11/10/local/168055/battle-against-sena-intensifies.

[16] Department of Census and Statistics Sri Lanka. 2021. Paddy Statistics. Retreived May 14, 2021 from http://www.statistics.gov.lk/Agriculture/StaticalInformation/rubpaddy .

[17] Thiruchelvam, S. 2005. Efficiency of rice production and issues relating to cost of production in the districts of Anuradhapura and Polonnaruwa. *J. Nat.Sci. Foundation of Sri Lanka*. 33(4): 247-256.