Project ID -787

Competitive Research Grant

Sub-Project Completion Report

on

OFFLINE FERTILIZER RECOMMENDATION THROUGH MOBILE APPS

Project Duration

May 2017 to September 2018

Soil Resource Development Institute (SRDI),
Krishikhamar sarak,Dhaka-1215.

Submitted to
Project Implementation Unit-BARC, NATP 2
Bangladesh Agricultural Research Council
Farmgate, Dhaka-1215

September 2018

Competitive Research Grant

Sub-Project Completion Report

on

OFFLINE FERTILIZER RECOMMENDATION THROUGH MOBILE APPS

Project Duration

May 2017 to September 2018

Soil Resource Development Institute (SRDI)
Krishikhamar Sarak,Dhaka-1215.

Submitted to
Project Implementation Unit-BARC, NATP 2
Bangladesh Agricultural Research Council
Farmgate, Dhaka-1215

September 2018

Citation:
Ahmed, M. and Moula S. A., 2018. Offilene Fertilizer Recommendation through Mobil Apps.
Project Implementation Unit
National Agricultural Technology Program-Phase II Project (NATP-2)
Bangladesh Agricultural Research Council (BARC)
New Airport Road, Farmgate, Dhaka – 1215
Bangladesh

Edited and Published by:

Project Implementation Unit
National Agricultural Technology Program-Phase II Project (NATP-2)
Bangladesh Agricultural Research Council (BARC)
New Airport Road, Farmgate, Dhaka – 1215
Bangladesh

Acknowledgement

The execution of CRG sub-project has successfully been completed by Soil Resource Development Institute using the research grant of USAID Trust Fund and GoB through Ministry of Agriculture. We would like to thanks to the World Bank for arranging the grand fund and supervising the CRGs by BARC. It is worthwhile to mention the cooperation and quick responses of PIU-BARC, NATP 2, in respect of field implementation of the sub-project in multiple sites. Preparing the project completion report required to contact a number of persons for collection of information and processing of research data. Without the help of those persons, the preparation of this document could not be made possible. All of them, who made it possible, deserve thanks. Our thanks are due to the Director PIU-BARC, NATP 2 and his team who given their whole hearted support to prepare this document. We hope this publication would be helpful to the agricultural scientists of the country for designing their future research projects in order to technology generation as well as increasing production and productivity for sustainable food and nutrition security in Bangladesh. It would also assist the policy makers of the agricultural sub-sectors for setting their future research directions.

Published in: September 2018

Printed by:

Acronyms

BARC	:	Bangladesh Agricultural Research Council
PIU	:	Project Implementation Unit
NATP	:	National Agricultural Technology Program
CRG	:	Competitive Research Grant
SRDI	:	Soil Resource Development Institute
FRG	:	Fertilizer Recommendation Guide
UDC	:	Union Digital Center

Table of Contents

Executive Summary

Mobile phone technology has grown significantly over the past decade and become an essential part of our everyday life and changing the way we live tremendously. Mobile is the most common form of communication to disseminate information and new technologies to different layers of a society smoothly and is increasingly available in remote areas. Farmers in developing countries struggle to get information and new technologies about agricultural best practices including soil fertility and soil test basis fertilizer dose because poor communication infrastructure in isolated rural areas inhibit access to information source. Using mobile apps can bridge this information gap very effectively. Farmers can purchase mobile phone easily than other communication tool. In the preceding few years, the mobile users have migrated in masses from traditional phones to smart phones, and one of the key driving forces for the adoption of the smart phone is the mobile application popularly known as mobile apps. As the number of smart phone user increase, the number of mobile apps users also increase in a proportion way and this is the key point to disseminate the location wise fertilizer recommendation app to the farmers effectively.

Soil is the most important natural resources for crop production and storehouse of plant nutrients. Except carbon, hydrogen and oxygen, all the rest 13 elements are taken up by plants from soil. But the soil nutrient is not an inexhaustible resource and must be replenished according to the nutrient withdrawal. Soils of Bangladesh have lost its fertility to a great extent due to exhaustion of nutrients for continues cropping with imbalance use of chemical fertilizers. As a result, the productivity of the soil is trending to low and decline in crop yields has been reported in many areas in Bangladesh. Imbalanced use of fertilizers, unplanned cultivation and improper management of soil has already caused stagnation in crop production or reduction in yield of high yielding varieties. For restoring and improving the soil health, it is need to special care for increasing crop production through dissemination of appropriate technology especially soil test based fertilizer recommendation among the farmers through mobile apps due to availability of mobile phones.

This mobile app has become the first addition to the android phone market in Bangladesh that can provide Agro-information on location wise specific fertilizer dose and application method for almost all crops described as Fertilizer Recommendation Guide-2012. The farmers/users need not have any internet connection to operate this app as it is devised to work in an offline mode. This android based app is designed in a simple and easy way for farmers who have lacking mobile operating skills so that they can operate it smoothly by following the audio instruction and select expected crop to see the crop image content of the app.

The Entrepreneurs of Union Digital Centre and Extension worker, even the scientists of SRDI and other organizations can also use this app for giving location specific fertilizer recommendation to the farmers and getting necessary information from this database. The fertilizer dose or other information (e.g. salinity management, soil acidity management etc.) that farmers will receive from this app is based on latest research and information of Upazila Land and Soil Resources Utilization Guide (Popularly known as Upazila Nirdeshika) of SRDI and Fertilizer Recommendation Guide-2012 of BARC. The farmers/users with android phones can download the app as open source at free of cost and disseminate the app by using ‘share it’ option easily. The implementation of this sub project will lead to establish an integrated and effective soil, crop and fertilizer management in Bangladesh in the long run. So using mobile apps at grass root level of farmers get fertilizer recommendation for different crops then it will benefit for the farmers and gain widespread popularity.

CRG Sub-Project Completion Report (PCR)

A. Sub-project Description

1. **Title of the CRG sub-project:** Offline fertilizer recommendation through mobile apps

2. **Implementing organization:** Soil Resource Development Institute (SRDI). Ministry of Agriculture, Krishi Khamar Sarak, Dhaka-1215.

3. **Name and full address with phone, cell and E-mail of PI/Co-PI (s):**

Principal Investigator: Dr. Mohiuddin Ahmed
Principal Scientific Officer
Soil Resource Development Institute
Regional Laboratory, Dhaka.
E-mail : pdodfrp2015@gmail.com
Cell :+8801712853645, Phone : +8802-58155964.

Co-Principal Investigator: Md. Safiqul Moula
Scientific Officer
Soil Resource Development Institute
Regional Laboratory, Kushtia-7000.
E-mail: safiqm061980@gmail.com
Cell: +8801719409773, Phone:+88071-63133.

4. **Sub-project budget (Tk):**
   4.1 Total:Taka 29,99,415.00
   4.2 Revised (if any): Taka 29,18,101.00

5. **Duration of the sub-project:**
   5.1 Start date (based on LoA signed): 14 May, 2017
   5.2 End date: 30 September 2018

6. **Justification of undertaking the sub-project:**
   The traditional system of calculating or generating soil test based fertilizer recommendation has been automated through development of Online Fertilizer Recommendation System. This service has not reached its expected level because of limitation of using computer in the field. To make the soil test based fertilizer recommendation more effective and to increase or expand the service area, SRDI has decided to develop mobile apps based fertilizer recommendation system with the financial support of PIU-BARC, NATP-2 for all crops covering the whole country using the soil and land resource database generated by SRDI.

7. **Sub-project goal:**
To contribute to the production of crops by sustaining productivity of the land and ensuring efficient use of fertilizers through using mobile apps.

8. **Sub-project objective (s):**

a. To provide location specific instant offline fertilizer recommendation through mobile app directly to the farmers as well as other beneficiaries i.e. agricultural extension worker, entrepreneurs of UDC, Scientists of SRDI and other Organization.

b. To reduce misuse of chemical fertilizers as well as increase crop production by using union wise soil test based balanced fertilizer through this mobile app.

c. To develop and disseminate a union wise soil fertility and fertilizer use database that will lead to establish an integrated and effective soil, crop and fertilizer management in Bangladesh in the long run.

9. **Implementing location (s): All the 460 upazillas of Bangladesh.**

10. **Methodology in brief:**

The sub-project was implemented at all the Upazila's (460 Volume) of Bangladesh by all the district office, regional laboratory, regional office, research centre and head office of SRDI.

Plan of Action: Plan of Action for making location wise Fertilizer Recommendation Mobile Apps are given below-

i. Collection of soil ἑ land physiographic map along with UpazilaNirdeshika of the targeted upazilas (460 volumes).
ii. Classifying the chemical data (soil test values) on the basis of land type, soil texture, soil group, and other characteristics of a union using soil ἑ land physiographic map.
iii. Upazilla and union wise processed data entry to the main database.
iv. Calculation appropriate doses of fertilizer on the basis of average soil test value by interpreting the nutrient uptake by different crops along with varieties considering the fertility status (very low, low, medium, optimum etc.)
v. Integration of the methods of fertilizer application based on fertilizer and crop.
vi. Preparation of mobile apps by making android mobile version of this location wise fertilizer recommendation in an offline mode so that the farmers/uses use it without any internet connection at free of cost.
vii. Arrangement of awareness program to transfer and diffusion of this mobile apps including workshop, distribution of leaflets, poster, festoon, banner and using different social media i.e. facebook, alapon (Govt. apps), e-mailing, imo etc.
viii. Uploading this app to the Google play store so that anyone can download it for use or disseminate among the farmers by using `share it' option of android phone.

11. Results and discussion:

Mobile app from software database has been developed that can provide agro-information on location wise specific fertilizer dose and application method for almost all crops described as Fertilizer Recommendation Guide-2012. Develop mobile app is user friendly and easily usable. Soil test based location specific fertilizer recommendation may be made available to the grass root level in an of line mode (i.e. without any internet connection. Moreover, this mobile app would play a vital rote to digitize fertilizer recommendation system as well as agriculture sector of Bangladesh.

12. Research highlight/findings:

a. Mobile app from software database has been developed which is become the first addition in the android phone market in Bangladesh.
b. This mobile app is able to provide balanced fertilizer recommendation to the farmers without any hassle and complexities.
c. Develop mobile app would be helpful in increasing crop production and quality as well saving the valuable time, labours and cost of the farmers.

B. Implementation Position

1. Procurement:

Description of equipment and capital items	PP Target		Achievement		Remarks
	Phy (#)	Fin (Tk)	Phy (#)	Fin (Tk)	
(a) Office equipment (i) File cabinet, Steel Almirah, Office table, Com. Table & Chair.	Each -1	67,850.00	Each -1	67,850.00	100 %
(ii) Desktop, Laptop, Camera, Printer	Each-1	214,350.00	Each-1	214,350.00	100 %
(b) Lab &field equipment	-	-	-	-	-
(b) Other capital items (i) Mobile Apps	1	14,52,550.00	1	14,52,550.00	100 %

2. Establishment/renovation facilities: N/A

Description of facilities	Newly established		Upgraded/refurbished		Remarks
	PP Target	Achievement	PP Target	Achievement	

3. Training/study tour/ seminar/workshop/conference organized:

Description	Number of participant			Duration (Days/weeks/ months)	Remarks
	Male	Female	Total		
(a) Training	-	-	-	-	-
(b) Workshop	95	20	115	1 (One) day	

C. Financial and physical progress

Fig in Tk

Items of expenditure/activities	Total approved budget	Fund received	Actual expenditure	Balance/ unspent	Physical progress (%)	Reasons for deviation
A. Contractual staff salary	214414	214414	214414	0	100 %	-
B. Field research/lab expenses and supplies	1452550	1412800	1412800	39750(-)	100 %	GOB money allocation was not found
C. Operating expenses	426683	426108	426108	575 (-)	100 %	RPA-500/- GOB-75/- money allocation was not found
D. Vehicle hire and fuel, oil & maintenance	69000	69000	69000	0	100 %	-
E. Training/workshop/ seminar etc.	260000	247960	247960	12040 (-)	100 %	GOB money allocation was not found
F. Publications and printing	100000	55078	55078	44922(-)	100 %	RPA-29922/- & GOB-15000/- money allocation was not found
G. Miscellaneous	113254	112039	112039	1215 (-)	100 %	GOB money allocation was not found
H. Capital expenses	282200	282200	282200	0	100 %	-

D. Achievement of Sub-project by objectives: (Tangible form)

Specific objectives of the sub-project	Major technical activities performed in respect of the set objectives	Output(i.e. product obtained, visible, measurable)	Outcome(short term effect of the research)
To provide location specific instant offline fertilizer recommendation through mobile app directly to the farmers as well as other beneficiaries i.e. agricultural extension worker, entrepreneurs of UDC, Scientists of SRDI and other Organization.	Tendering activities done to collect Upazilla wise mobile apps prepared for location specific offline fertilizer recommendation	Preparation of mobile app from software database has been completed.	User friendly and easily usable mobile apps in recommending fertilizer use for all crops are available in Google play store.
To reduce misuse of chemical fertilizers as well as increase crop production by using union wise soil test based balanced fertilizer through this mobile app.	User friendly and easily usable mobile apps in recommending fertilizer use for all crops are available in google play store.	Balanced fertilizer doses has provided to the farmers/other beneficiaries.	Motivation of the farmers to make effective use of balanced doses of fertilizer. Increase in Crop production and quality, saving of the valuable time, labour and cost of the farmers.
To develop and disseminate a union wise soil fertility and fertilizer use database that will lead to establish an integrated and effective soil, crop and fertilizer management in Bangladesh in the long run.	All the 460 upazilla's data entried onto the database software	Preparation of database software (logics/algorithm) Based on soil nutrient database and crop fertilizer requirement have completed.	Soil test based location specific fertilizer recommendation now available to the grass root level .

E. Materials Development/Publication made under the Sub-project:

Publication	Number of publication		Remarks (e.g. paper title, name of journal, conference name, etc.)
	Under preparation	Completed and published	
Technology bulletin/booklet/leaflet/flyer etc.	-	**5000 Nos.**	
Journal publication			
Information development			
Other publications, if any PCR	**-**	**400 Copy**	

F. Technology/Knowledge generation/Policy Support (as applied):

i. **Generation of technology (Commodity & Non-commodity)**
This mobile app has become the first addition to the android phone market in Bangladesh that can provide Agro-information on location wise specific fertilizer dose and application method for almost all crops described as Fertilizer Recommendation Guide-2012.

ii. **Generation of new knowledge that help in developing more technology in future**
Soil test based location specific fertilizer recommendation will be available to the grass root level in an offline mode (without any internet connection).

iii. **Technology transferred that help increased agricultural productivity and farmers' income**
The entrepreneurs of UDC, extension worker and scientists of SRDI will be able to provide fertilizer recommendation to the farmers without any hassle and complexities by using this mobile app which leads to increase in Crop production and quality, saving of the valuable time, labour and cost of the farmers.

iv. **Policy Support**
This mobile app will be played a great role to digitized fertilizer recommendation system as well as agriculture sector of Bangladesh.

G. Information regarding Desk and Field Monitoring

i) **Desk Monitoring [description & output of consultation meeting, monitoring workshops/seminars etc.):**
Desk monitoring has been done through evaluating the different report, SOE etc.

ii) **Field Monitoring (time& No. of visit, Team visit and output): N/A**

H. Lesson Learned/Challenges (if any)

- Software develop in this project is not same that was developed earlier by SRDI with the help of Katalist.
- SRDI able to perform and update the develop software without help of vendor.
- Downloading provision is location that is union wise.

I. Challenges (if any)

- Short duration of the sub project

Signature of the Principal Investigator Date ……. Seal	Counter signature of the Head of the organization/authorized representative Date …….. Seal