# Introducing an agricultural app to urban vegetable farmers: a pilot study in Hanoi

Trang Bui, Nguyen Thi Tan Loc, Nguyen Thi Sau, Nozomi Kawarazuka, Pepijn Schreinemacher, Yanyan Liu.

AUG
2022

CGIAR | Plant Health Initiative

CIP INTERNATIONAL POTATO CENTER CGIAR

World Vegetable Center

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE IFPRI

**Introducing an agricultural app to urban vegetable farmers: a pilot study in Hanoi**

Authors:
Trang Bui, Nguyen Thi Tan Loc, Nguyen Thi Sau, Nozomi Kawarazuka, Pepijn Schreinemacher, Yanyan Liu



ISBN: 978-92-9060-635-2
DOI: 10.4160/9789290606352



International Potato Center
P.O. Box 1558, Lima 12, Peru
cip@cgiar.org • www.cipotato.org

Citation:
Bui T., Nguyen T T L., Nguyen T S., Kawarazuka N., Schreinemacher P., Liu, Y., 2022. Introducing an agricultural app to urban vegetable farmers: a pilot study in Hanoi. International Potato Center. 20 p.

Design and Layout:
Communications Department
August 2022

CIP also thanks all donors and organizations that globally support its work through their contributions to the CGIAR Trust Fund: www.cgiar.org/funders

# Contents

# Summary

Plantix is an agricultural app which offers diagnosis and advice for more than 30 crops. It was developed by a private company based in Germany. It has a great potential as a new form of extension service complementing a traditional face-to-face extension service. CGIAR's Plant Health Initiative seeks to introduce the app as part of a package of innovations available for integrated pest and disease management to facilitate farmers' behavioral change. Plantix has been widely used in India, but it has not been very common yet in Vietnam.

The aim of this pilot study is to test the usability of Plantix app for urban vegetable growers in Hanoi, Vietnam. 12 farmers (6 women and 6 men) participated in the training on how to use the app and provided feedback after a two-week trial.

Results show that both women and men farmers are greatly interested in using the app. Some farmers purchased and sprayed appropriate pesticides following advice from the app. Each participant shared the app with 2-5 relatives, friends and/or neighbors. Women shared the app with their husbands as well as their female peers, while men tended to share it with their male peers.

Although this pilot study confirms the usability of the app in the urban context of Vietnam with few constraints in access to internet and digital literacy for both women and men, some adjustments are required to meet their needs and to fit with the context.

# 1. Introduction

Overuse of pesticides in vegetable production has been a long-standing issue in human health and the environment in Vietnam (Hoi et al., 2016). However, reducing pesticides has been a great challenge. At the farm level, major challenges associated with farmers' decisions include their limited awareness of risks, a high level of satisfaction with conventional practices, and limited knowledge on integrated pest management (IPM) (Schreinemachers et al., 2015).

IPM has originally been disseminated through farmer field schools and extension services. More recently, ICT such as mobile apps have increasingly been adopted as an alternative or complement to traditional face-to-face approaches to disseminating new information, technologies and practices.

Vietnam's digital infrastructure is well established, ranked third in the world in terms of the affordability of information and communication. 99% of rural and urban areas have access to electricity and 90% of famers own mobile phones (Burra et al., 2021). The Ministry of Agriculture and Rural Development supports the digitalization of agriculture in collaboration with the private sector, and several pilot projects of smart agriculture have been conducted across the country (Sakata, 2019).

ICT has a great potential to fill the gap in access to information and training for those who have been marginalized in traditional extension services with collective learning systems. However, digital technologies for agriculture are not necessarily designed for low income, less educated and/or women farmers in terms of the cost, ease of use, information contents and proposed solutions (Coggins et al., 2022; Krell et al., 2021). In Vietnam, men farmers are more likely to benefit from mobile phone information for their agricultural production and marketing compared to women farmers, although women are more or less equally involved in both agricultural production and marketing (Hoang & Drysdale, 2021).

In fact, the same issues have been observed in traditional extension services in Vietnam, whose approaches are more suitable to better-off male farmers (Lovell et al., 2021). Therefore, ICT agriculture that simply follows traditional extension approaches cannot be transformative in the aspects of equity and inclusiveness. Instead, it risks reinforcing existing gaps by disadvantaging marginalized social groups especially women who are in fact the majority of smallholders in the global South (Hargittai, 2018; O'Donnell & Sweetman, 2018; Schelenz & Pawelec, 2022). ICT interventions for women need to be adjusted according to their specific needs, interests and capacity.

The objective of this pilot study is to explore the potential for using agricultural app Plantix to reduce pesticide uses among small-scale urban Vegetable farmers, both women and men in Hanoi. Plantix offers six services to users: 1) Diagnosis and treatment advice; 2) Fertilizer calculation; 3) Farming tips; 4) Disease warning and prevention; 5) Farmer community and 6) Agricultural weather forecast. Currently, it offers instant diagnosis and treatment advice for 30 crops, vegetables and fruits.

Plantix has been widely used by male vegetable growers in India. We test this app in the context of Vietnam with both men and women vegetable growers. In particular, we seek gender-responsive participatory collective learning approaches targeting women and men.

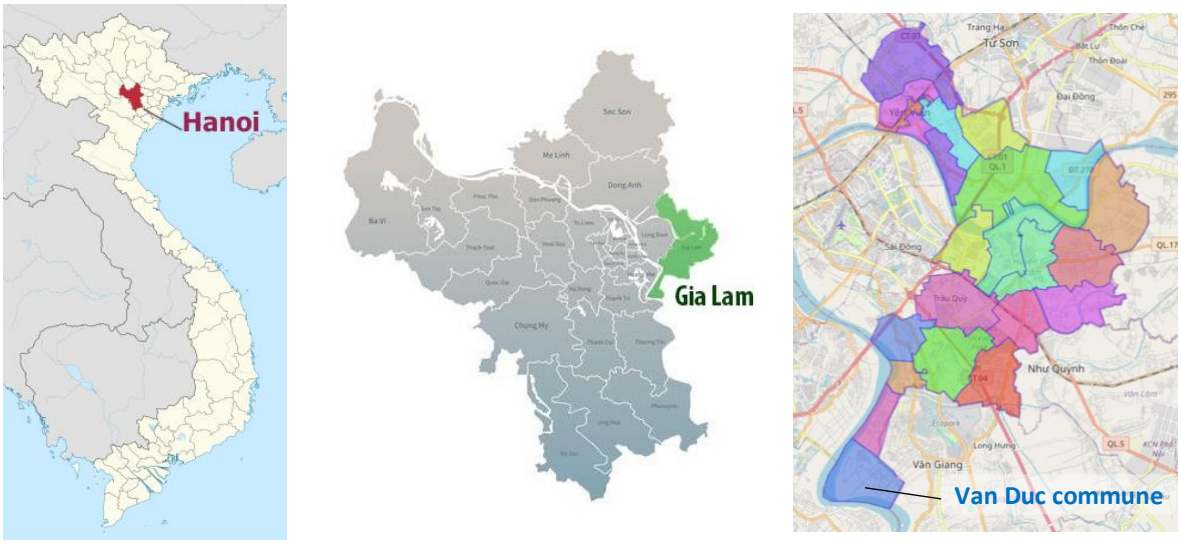
This study also follows the scaling readiness approach (Sartas et al., 2020). A core innovation which we aim to scale is Plantix. In this first stage, we test the core innovation, seek possible complementary innovations appropriate to a given gender and social context and identify stakeholders who can potentially facilitate scaling.

# 2. Methods

## 2.1. Site selection

The pilot study was conducted in Van Duc Commune, Gia Lam district in Hanoi in July 2022. Hanoi consists of 12 urban districts, one district-leveled town and 17 rural districts. Gia Lam district (Figure 1) was selected as it is well-known for vegetable production. Gia Lam district consists of 2 townships and 20 communes. Van Duc Commune has five villages. We invited farmers from four villages. Major vegetables grown in the study commune are cabbages, mustard greens, cauliflower, broccoli, bitter gourds. Apart from vegetables, farmers also grow flowers and raise livestock. There is no rice production in the study site.

**Figure 1: Van Duc commune, Gia Lam district, Hanoi, Vietnam**




Vietnam | Hanoi | Gia Lam

## 2.2. The selection of participants

12 vegetable growers (six women and six men) are selected from four villages in Van Duc commune. The research team consulted with the local authority to select participants based on three criteria: 1) farmers who grow vegetables for sale; 2) farmers who have android smart phones & data plan; and 3) farmers who are interested in learning methods on how to treat pests and diseases better. We also requested to have a gender balance in participants and include young farmers if any. However, young people do not engage in agriculture in the study site. The youngest participant was 38 years old.

Two male students from Vietnam National University of Agriculture, who live in the study commune, joined the research team to provide technical support to participants. The director and vice director of farmer cooperative were also invited as key stakeholders who could facilitate the dissemination of Plantix in the future.

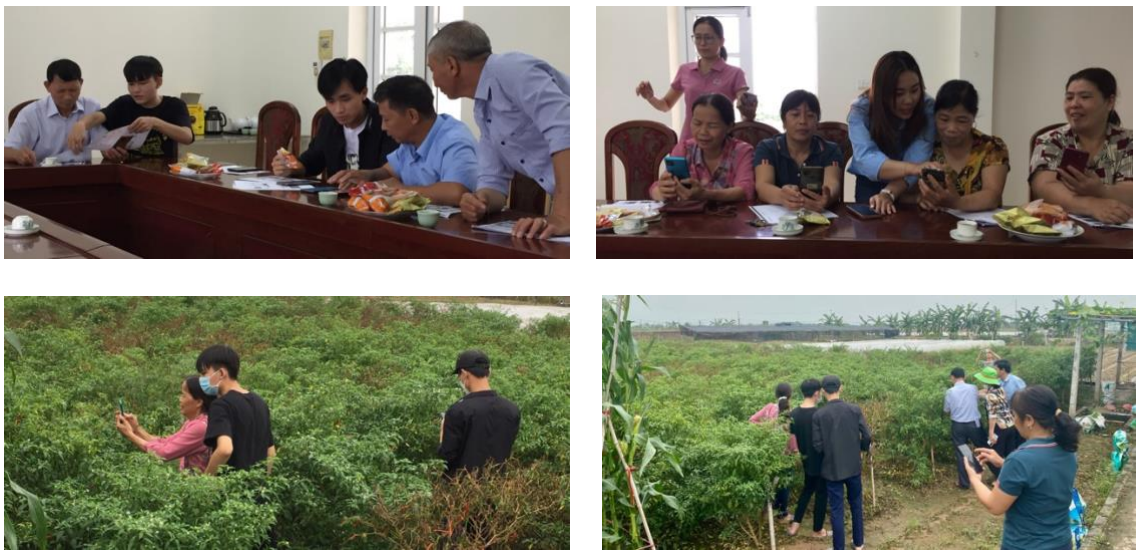
According to local authorities and farmers, most farmers have smart phones with internet. Although there is no statistic, many farmers use iPhones. This can be a major challenge for introducing Plantix in Vietnam.

## 2.3. Training methods

The Plantix training was conducted on 8 July. The training included the introduction of Plantix, downloading the app, field trial and an initial feedback session. During the two-week trial in their own farms, we made phone calls to some farmers twice to assist them to solve technical issues, and to monitor their progress with Plantix.

In addition, training participants are connected with a communication message app called "Zalo" to facilitate their collective learning and exchange information during the trial. The research team also joined this group to monitor and facilitate the group's communication.

**Figure 2: Photos during the training**

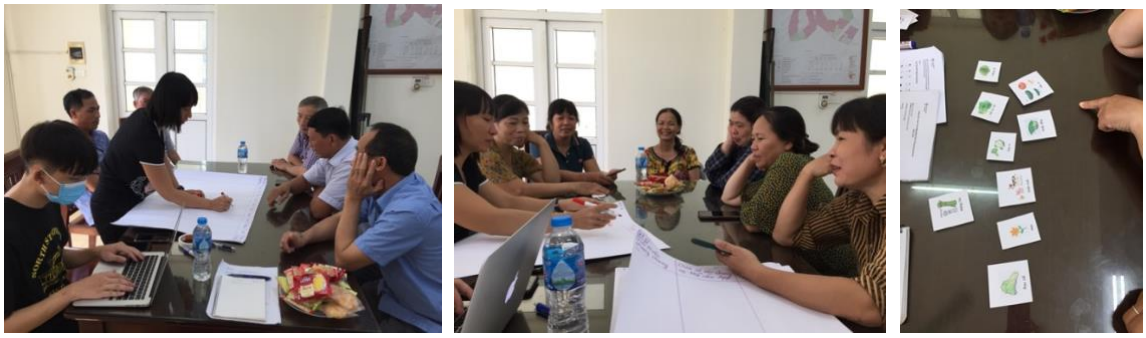


## 2.4. Feedback methods

After the two-week trial period, two focus group discussions (one with men, another one with women) were conducted to receive their feedback. Six women and five men participated in the focus group discussions.

Focus group discussions consisted of four topics: 1) local crop calendar and seasonal differences in pests and diseases; 2) feedback on the content of the Plantix app; 3) behavioral change and information sharing; 4) potential constraints for some farmers in using this app.

**Figure 3: Photos during the feedback session**



## 2.5. Data analysis method

A digital extension tool assessment framework was developed drawing on Coggins et al. (2022). Coggins et al. (2022) identified major constraints to use a digital extension tool in the global south and they divided constraints into three categories: 1) access to digital information; 2) the technical contents of the tool: and 3) behavioral change. We followed these categories with specific considerations to gender- and age-based constraints in this assessment framework (Table 1).

**Table 1: Plantix Assessment Framework**

| | | Questions to consider |
|---|---|---|
| Access interface | Unaware of the usefulness of the digital extension app | How will the plantix app be marketed? |
| | | Can users easily share the app information? |
| | Device inaccessible | Who can/can't access required devices? |
| | | Are accessible devices of sufficient quality to use DET (including operating software, durability, screen size, processing speed)? |
| | Electricity inaccessible | Can farmers access electricity with limited monetary and travel costs? |
| | Mobile network inaccessible | Is the Plantix app appropriate for the mobile network reliability, speed and affordability? |
| | Insensitive to digital illiteracy | Do farmers already use various apps in their mobile phones? |
| Access content | Insensitive to illiteracy | Is reading or typing required to use the DET? |
| | Unfamiliar language | Can the Plantix offer local terms and metrics? |
| | Slow to access | How long does it take for users to access benefits? |
| | Hard to interpret | Is the content visual (or at least visualizable)? |
| | Unengaging | Can the Plantix involve games, stories, humor, visuals or human interaction? |
| Change behavior | Insensitive to knowledge | Does the Plantix information include (or at least adapt to) users' preexisting knowledge? |
| | Insensitive to priorities | Are the Plantix priorities (e.g. increased yield, reduced risk) set by users or others? |
| | Insensitive to socio-economic constraints | Does the Plantix provide users with options? |
| | Irrelevant to farm | Can the Plantix be adapted to local soils, climates, agronomic practices and crop calendars? |
| | Distrust | Is the Plantix branding familiar and trusted? |

Source: Coggins et al. (2022)

# 2. Results

## 4.1 Access to smart phones, mobile networks and digital literacy

In Vietnam in general, and in the study site in particular, smart phones are very common for both women and men. The pilot study confirms that although farmers in their 50s and 60s have limited experience of using apps as information sources, all participants quickly learned and enjoyed using the app.

Only one male farmer in his 60s did not use the app during the trial period. The reason was that his phone did not have a mobile data (4G) and therefore not able to use on his farm. Not having a mobile data can be a constrain as they cannot receive diagnosis and advice immediately on the farm. However, another woman farmer still used her phone without a mobile data. She used the app when her phone was connected to WIFI at home.

Plantix does not have a service to iPhone users, which is the biggest constraint for disseminating the app.

## 4.2 Contents (languages, local terms and metrics)

Plantix's website and some illustrations in the app use images of male farmers, mostly from India. We need to request Plantix to include women farmers' images from Southeast Asia so that women users in Vietnam feel comfortable.

There are six functions in the app: 1) Diagnosis and treatment advice; 2) Fertilizer calculation; 3) Farming tips; 4) Disease warning and prevention; 5) Farmer community and 6) Agricultural weather forecast. 10 farmers out of eleven, used diagnosis and treatment advice. All six women farmers used agricultural weather forecast. The rest of functions were not used because vegetable production was off-season during the study period.

Fertilizer calculation needs to be adjusted in the local context. The app recommends single fertilizer (N, P, K), while local farmers use synthetic fertilizers (NPK at different rates of combination).

The unit of calculation for a crop area in the app is "ha". In Vietnam, "$m^2$" is better for small-holder farmers.

Farmers have confidence in fertilizer use and general knowledge on how to grow crops. A male farmer said "crop tips and fertilizer calculations are probably more suitable for those who are new to vegetable production or with little experience. We have grown vegetables for a long time, so we know very well about how to care and how to use fertilizers".

## 4.3 Crop relevance

Among 18 vegetables which many farmers grow in the study site, only 7 vegetables are available for diagnosis and treatment advice (Table 2).

**Table 2: Seasonal crop calendar with major crops grown in the study site**

| Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | June | July |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***tomato**, cauliflower, broccoli, leafy vegetables, **cabbage** | | | | | | | | | | | |
| | | | | | | | | | **maize**, **chili**, squash, **legumes**, **cucumbers**, off-season vegetables | | |
| | Chinese cabbage | | | | | | | | | | |
| Chinese mustard, **eggplant**, calabash, loofah, bitter gourd, banana | | | | | | | | | | | |
| | | | | | **groundnut, okra | | | | | | |
| (harvesting) | | | | | banana (planting) | | | | | | |
| | | | Pests and diseases | | | | | | Pests and diseases | | |
| Flea beetles year-round | | | | | | | | | | | |

*__Bold__: farmers already used the app or intend to use the app in the coming season
**Only a few farmers grow groundnut and okra.

Source: FGDs men and women's groups on 27 July 2022

As shown in the table above, pests and diseases are not prevalent in July which is an off-season. Therefore, farmers had limited opportunity for using the app.

Some farmers took pictures of other vegetables/fruits by using "others" function. Some vegetables are properly diagnosed such as asparagus (Rhizoctonia disease) and loofah (Black rot disease) while others (sapodilla, Chinese mustard) were not successful with the message "not identified".

Farmers requested for including following crops in the app: Chinese cabbage, cauliflower, broccoli, mustard green, asparagus, bitter gourd, squash, malabar spinach (fewer growers), kohlrabi (fewer growers).

Apart from vegetables, farmers also used or intended to use the app for fruits such as citrus (orange, kumquat), pomegranate, banana, mango, papaya and apple. Farmers also requested for diagnose and advice service for flowers and livestock which are important income sources.

There is no clear difference between men and women in the kinds of vegetables they used the app and the frequency of the use of app.

## 4.4 Behavioral change

Since July was off-season and farmers had limited crops to test the app, the pilot study only reveals a small aspect of farmers' behavioral change.

Some farmers immediately took actions after receiving diagnosis and advice from the app. For example, Ms. Quyên (51) used the app for sick maize and found that it was the yellow leaf disease (mold). This was the first time she learned the scientific name of disease. She went to an agricultural input shop to buy pesticide indicated in the app. Since the shop did not have the same one, she bought another product with the same ingredient.

Mr. Cần (43) used the app for chili and detected a disease, read the instruction on how to treat the disease. He bought and sprayed a pesticide based on the app's advice. However, it rained the following day, and he could not see if it worked or not.

Ms. Tú (57) used the app for her papaya and mango trees. Mango did not have any diseases while papaya was infected with a virus. She has read tips and advice. It was a great learning experience for her.

All farmers, except one male farmer, introduced this app to two to five people, mainly their relatives, friends and neighbors. A half of the people who received information downloaded the app in their phones. Women introduced the app to their husbands, male relatives, their female relatives and friends. On the other hand, men did not introduce the app to their wives, and they shared the app among their male peers.

The app appears to be a strong means of individual learning, increase farmers' confidence and bargaining power to input suppliers. The director of Van Duc farmer cooperative said "Usually, people depend on input suppliers for diagnosis and advice for pests and diseases. However, since suppliers are interested in making more profit from selling chemicals, they tend to sell more chemicals. Now, with this app, farmers can ask input suppliers to provide appropriate chemicals according to the instruction in the app".

Ms. Thục (43) said, "We used to depend on our own experience on managing pests and diseases, but we could not confidently diagnose diseases. We even don't know if it was a disease or a common phenomenon. When applying the Plantix app, we can immediately learn how a specific disease is treated. If all farmers use this app, the cost of pesticides will be greatly reduced through the use of appropriate chemicals with appropriate amount, frequency and timing. We no longer need to depend on what shop keepers say".

Mr. Toán (61) said "All farmers should apply this technology. The app helps farmers to increase awareness of pests and diseases and improve our practices of disease prevention and treatment. At the same time, this also provide an opportunity for farmers to improve their knowledge".

Thus, the app is promising in changing farmers' behavior including the (over) use of pesticides. Given that pests and diseases are more prevalent in specific seasons, we need to wait for a few months to see the real impact of the app in the study site.

Although we formed a group with Zalo to facilitate communications, farmers did not use this tool. This may be because participant farmers are not close friends with each other, and they managed to use the app without further instructions or communications. In the study site, the app can work as an individual tool rather than a tool for facilitating collective learning for both women and men.

## Discussion and conclusions

This pilot study confirms that participant farmers, both men and women, are greatly interested in using the app as a means of reducing pesticides and improving production and the quality of their agricultural produce.

There is no clear difference between men and women farmers in their interest and capacity of using the app, although from our observation, women appear to be keener on using the app than their male counterparts.

Among the 17 components of the check list for assessment, 7 components require adjustments to the local context (Table 3).

**Table 3: Plantix Assessment Framework Results**

| | | Questions to consider |
|---|---|---|
| Access interface | Unaware of the usefulness of the digital extension app | How will the plantix app be marketed?<br>The farmer cooperative plays a key role in facilitating the introduction of the app. |
| | | Can users easily share the app information?<br>Yes. Farmers confirm that the app information is easy to share for both men and women below 60 years old. |
| | Device inaccessible | Who can/can't access required devices?<br>iPhone users (it can be more than 50% of the farmers) |
| | | Are accessible devices of sufficient quality to use DET (including operating software, durability, screen size, processing speed)?<br>Yes. Farmers confirm that there is no problem. |
| | Electricity inaccessible | Can farmers access electricity with limited monetary and travel costs? Yes, electricity is 100% available in all households and affordable. |
| | Mobile network inaccessible | Is the Plantix app appropriate for the mobile network reliability, speed and affordability? Mobile networks work well on farms. Those who do not have mobile data (4G), they cannot receive diagnosis and advice on the farm but later they can do when they have access to internet. |
| | Insensitive to digital illiteracy | Do farmers already use various apps in their mobile phones?<br>No. We needed to guide them how to download the app. They need technical support for downloading the app. |
| Access content | Insensitive to illiteracy | Is reading or typing required to use the DET?<br>Yes, some reading is required but both men and women farmers confirmed that they have no problems. Some farmers are discouraged to read long texts. |
| | Unfamiliar language | Can the Plantix offer local terms and metrics?<br>Need to be adjusted (see the result section 2.2) |
| | Slow to access | How long does it take for users to access benefits?<br>They get some benefit instantly after taking a photo (obtaining new knowledge and information). |
| | Hard to interpret | Is the content visual (or at least visualisable)?<br>Yes, farmers are more interested in functions with visual sites than texts. |
| | Unengaging | Can the Plantix involve games, stories, humour, visuals or human interaction? No. However, the quick diagnosis and advice attracts farmers to keep using it. Plantix uses male farmers in images. Images of women farmers from various regions need to be included. |
| Change behavior | Insensitive to knowledge | Does the Plantix information include (or at least adapt to) users' preexisting knowledge? Some adjustments are required to include locally available pesticides and locally recommended IPM practices. |
| | Insensitive to priorities | Are the Plantix priorities (e.g. increased yield, reduced risk) set by users or others?<br>Further research is required during the production season for specific crops. |
| | Insensitive to socio-economic constraints | Does the Plantix provide users with options?<br>Not sure. We need to investigate further what options the Plantix provides and if the options can cover diverse needs and interests of farmers in different socio-economic conditions. |

| | | |
|---|---|---|
| | Irrelevant to farm | Can the Plantix be adapted to local soils, climates, agronomic practices and crop calendars? Further research is required during the production season for specific crops. |
| | Distrust | Is the Plantix branding familiar and trusted?<br>Although this is the first time, farmers fully trust information from the app. |

Based on this pilot study, we request Plantix for adjusting to the Vietnam context as follows:

- Include female images of farmers from Southeast Asia
- Adjust metrics from "ha" to "$m^2$" or use a local unit "sao" (1 sao is 360$m^2$ in the North, 500$m^2$ in Central, and 1000$m^2$ in the South)
- Provide fertilizer recommendations for synthetic fertilizers (NPK at different rates of combination).
- Guide us to include diagnosis and advice for following vegetables: Chinese cabbage, cauliflower, broccoli, mustard green, asparagus, bitter gourd, squash

The pilot study had a limitation in assessing some of the components related to technical issues such as comparing local practices and the app's advice, the availability of and access to suggested chemicals in local agricultural input shops. Further research is required to get more detailed information to request Plantix to make adjustments in technical parts.

# References


Burra, D. D., Hildebrand, J., Giles, J., Nguyen, T., Hasiner, E., Schroeder, K., Treguer, D., Juergenliemk, A., Horst, A., & Jarvis, A. (2021). *Digital agriculture profile: Viet Nam*. FAO. https://www.fao.org/3/cb3956en/cb3956en.pdf

Coggins, S., McCampbell, M., Sharma, A., Sharma, R., Haefele, S. M., Karki, E., Hetherington, J., Smith, J., & Brown, B. (2022). How have smallholder farmers used digital extension tools? Developer and user voices from Sub-Saharan Africa, South Asia and Southeast Asia. *Global Food Security*, *32*, 100577-100577. https://doi.org/10.1016/j.gfs.2021.100577

Hargittai, E. (2018). The digital reproduction of inequality. In D. B. Grusky & S. Szelényi (Eds.), *The inequality reader: Contemporary and foundational readings in race, class, and gender* (2nd ed., pp. 616-625). Routledge.

Hoang, H. G., & Drysdale, D. (2021). Factors affecting smallholder farmers' adoption of mobile phones for livestock and poultry marketing in Vietnam: Implications for extension strategies [Other Journal Article]. *Rural Extension and Innovation Systems Journal*, *17*(1), 21-30. https://search.informit.org/doi/10.3316/informit.685246169618015

Hoi, P. V., Mol, A. P. J., Oosterveer, P., van den Brink, P. J., & Huong, P. T. M. (2016). Pesticide use in Vietnamese vegetable production: A 10-year study. *International Journal of Agricultural Sustainability*, *14*(3), 325-338. https://doi.org/10.1080/14735903.2015.1134395

Krell, N. T., Giroux, S. A., Guido, Z., Hannah, C., Lopus, S. E., Caylor, K. K., & Evans, T. P. (2021). Smallholder farmers' use of mobile phone services in central Kenya. *Climate and Development*, *13*(3), 215-227. https://doi.org/10.1080/17565529.2020.1748847

Lovell, R. J., Shennan, C., & Thuy, N. N. (2021). Sustainable and conventional intensification: How gendered livelihoods influence farming practice adoption in the Vietnamese Mekong River Delta. *Environment, Development and Sustainability*, *23*(5), 7089-7116. https://doi.org/10.1007/s10668-020-00905-9

O'Donnell, A., & Sweetman, C. (2018). Introduction: Gender, development and ICTs. *Gender & Development*, *26*(2), 217-229. https://doi.org/10.1080/13552074.2018.1489952

Sakata, S. (2019). The application of information and communication technologies (ICT) in agriculture: Present status, opportunities, and challenges in Vietnam. In *New trends and challenges for agriculture in the Mekong region: From food security to development of agri-businesses*. Bangkok Research Center, JETRO Bangkok/IDE-JETRO.

Sartas, M., Schut, M., Proietti, C., Thiele, G., & Leeuwis, C. (2020). Scaling readiness: Science and practice of an approach to enhance impact of research for development. *Agricultural Systems*, *183*, 102874. https://doi.org/10.1016/j.agsy.2020.102874

Schelenz, L., & Pawelec, M. (2022). Information and communication technologies for development (ICT4D) critique. *Information Technology for Development*, *28*(1), 165-188. https://doi.org/10.1080/02681102.2021.1937473

Schreinemachers, P., Afari-Sefa, V., Heng, C. H., Dung, P. T. M., Praneetvatakul, S., & Srinivasan, R. (2015). Safe and sustainable crop protection in Southeast Asia: Status, challenges and policy options. *Environmental Science & Policy*, *54*, 357-366. https://doi.org/10.1016/j.envsci.2015.07.017

# Acknowledgement

This pilot study was conducted with the financial support of CGIAR's Plant Health and Rapid Response to Protect Food Security and Livelihoods Initiative (Plant Health Initiative), in collaboration with World Vegetable Cetner, Fruits and Vegetable Research Institute (FAVRI), and the local authority and farmer cooperative in Gia Lam district, Hanoi.

# Appendix

## List of participants

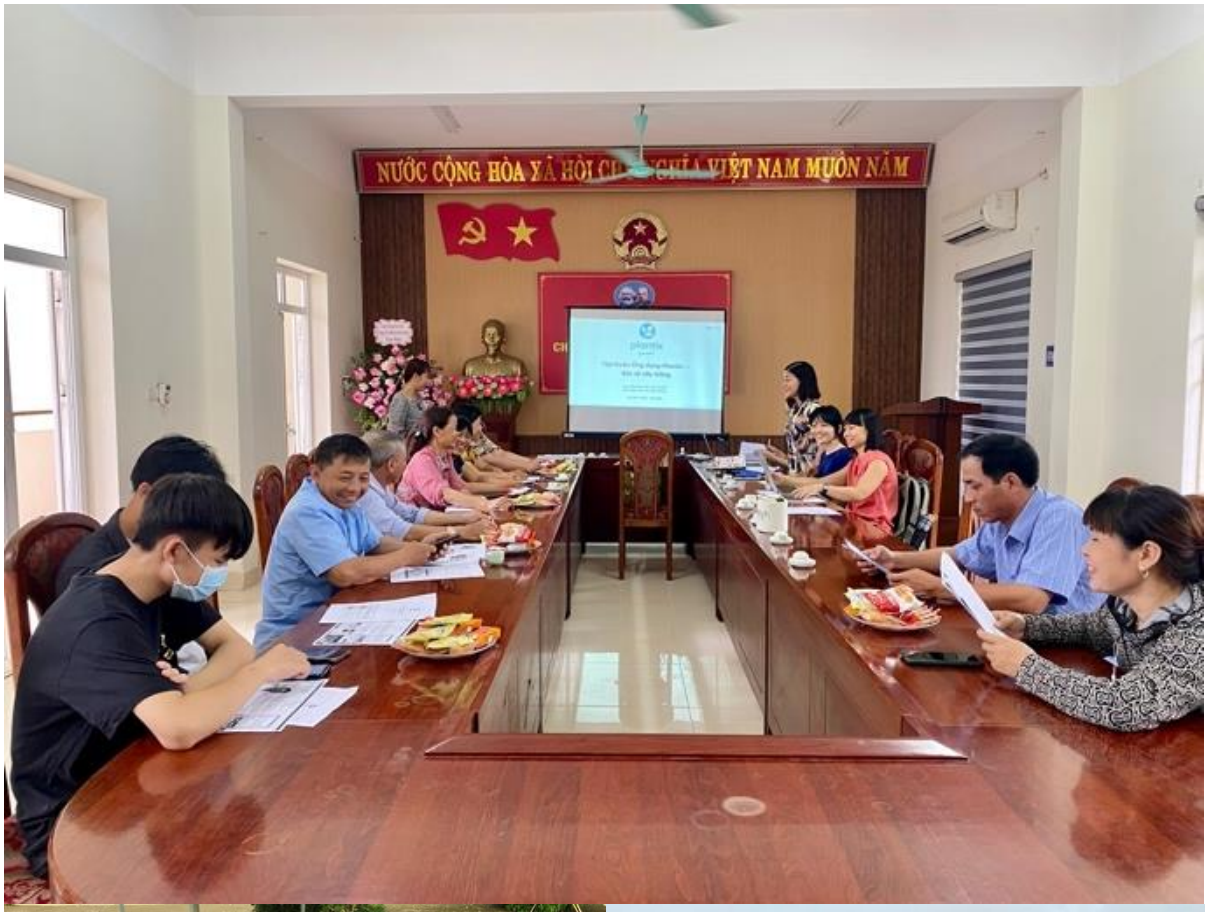
| No. | Name | Age | Gender | Village | Training 08 Jul | FGD 27 Jul | Notes |
|---|---|---|---|---|---|---|---|
| **I. Farmers from Văn Đức commune, Gia Lâm district, Hanoi** | | | | | | | |
| 1 | Chử Thị Thục | 43 | F | Chử Xá | x | x | Only grow vegetables |
| 2 | Chử Thị Đông | 48 | F | Chử Xá | x | x | Only grow vegetables |
| 3 | Chử Văn Cần | 43 | M | Chử Xá | x | x | 7 sao of vegetables |
| 4 | Đặng Thị Tú | 57 | F | Chử Xá | x | x | Late |
| 5 | Vũ Thị Hương | 38 | F | Chử Xá | x | x | Only grow vegetables |
| 6 | Đặng Thị Châu | 48 | F | Trung Quan 1 | x | x | Only grow vegetables |
| 7 | Đặng Văn Huân | 62 | M | Trung Quan 1 | x | Absent | |
| 8 | Nguyễn Văn Bá | 60s | M | Trung Quan 1 | x | X | |
| 9 | Nguyễn Văn Cảnh | 46 | M | Trung Quan 2 | x | x | 3 sao ,vegetables, kumquat |
| 10 | Đặng Văn Hưng | 56 | M | Trung Quan 3 | x | x | 8 sao, vegetables |
| 11 | Trịnh Văn Toán | 61 | M | Trung Quan 3 | x | x | 8 sao, vegetables |
| 12 | Đặng Thị Quyên | 51 | F | Trung Quan 3 | x | x | Only grow vegetables |
| **II. Other stakeholders** | | | | | | | |
| 1 | Lý Văn Yên | 19 | M | Chử Xá | x | X | Student (VNUA) |
| 2 | Trần Tiến Thành | 19 | M | Chử Xá | x | Absent | Student |
| 3 | Nguyễn Văn Phú | | M | | x | Absent | Co-op Director |
| 4 | Đinh Thị Mai | | F | | x | x | Co-op Vice Director |

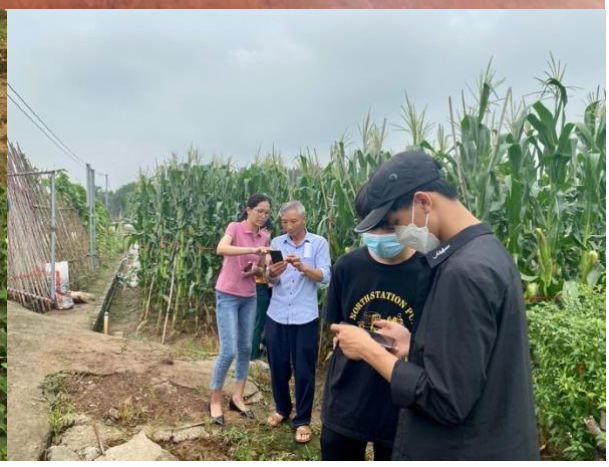
*One sao is 360m$^2$
*All names have been changed

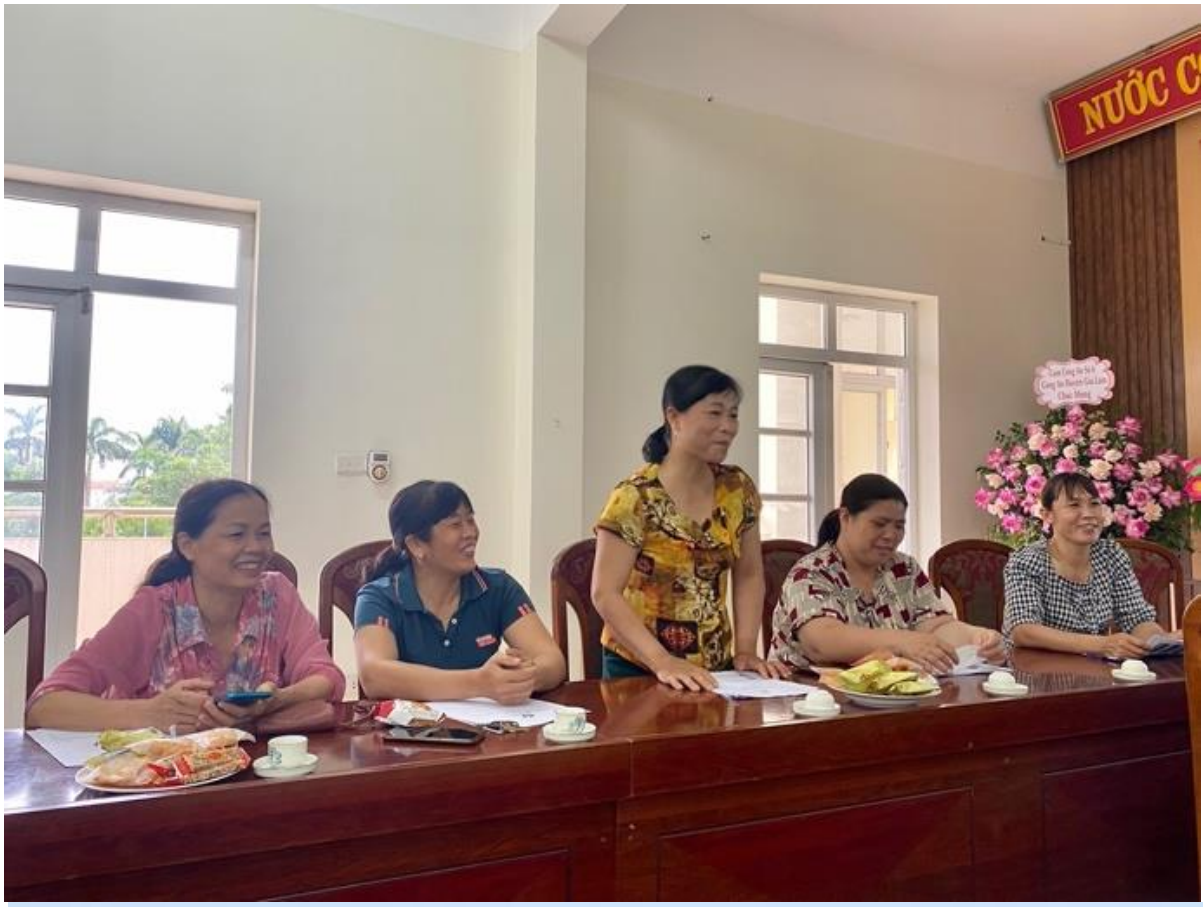
## Links to documents

Training materials (link)
A questionnaire for focus group discussions (link)
Original notes on focus group discussions (link)
Original notes on farmers' feedback during the two-week trial period (link)

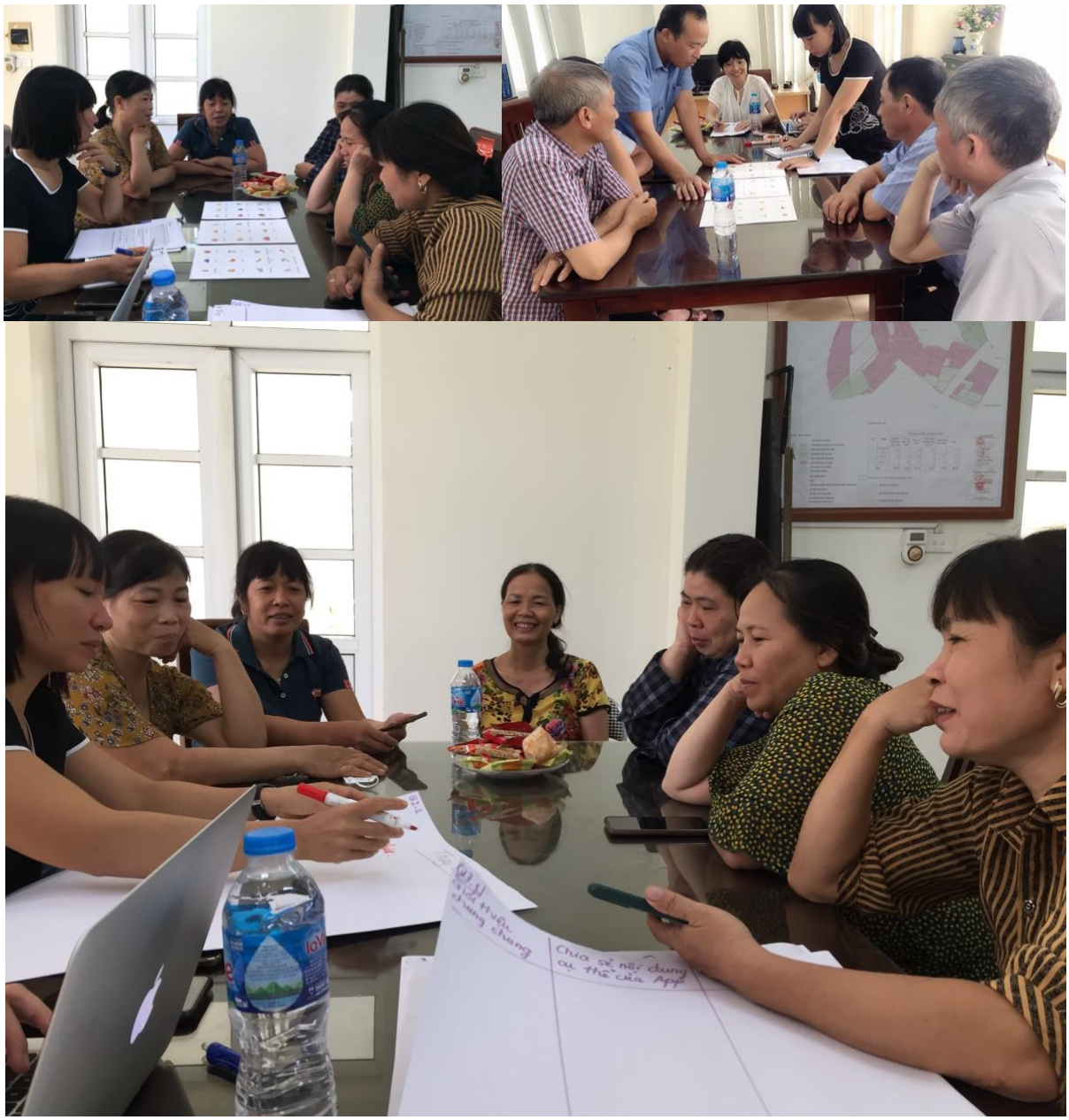
## Photos






ĐẢNG ỦY - HĐND - UBND
XÃ VĂN ĐỨC



WWW.CIPOTATO.ORG

CIP is a research-for-development organization with a focus on potato, sweetpotato and Andean roots and tubers. It delivers innovative science-based solutions to enhance access to affordable nutritious food, foster inclusive sustainable business and employment growth, and drive the climate resilience of root and tuber agri-food systems. Headquartered in Lima, Peru, CIP has a research presence in more than 20 countries in Africa, Asia and Latin America.
*www.cipotato.org*

CIP is a CGIAR research center, a global research partnership for a food-secure future. CGIAR science and innovation seeks to advance the transformation of food, land, and water systems in a climate crisis. Its research is carried out by 15 CGIAR centers in close collaboration with hundreds of partners, including national and regional research institutes, civil society organizations, academia, development organizations and the private sector.
*www.cgiar.org*

**For more information,** please contact CIP Headquarter. Av. La Molina 1895, La Molina. Apartado 1558, Lima 12, Peru.

*5-11-3496017* *cip-cpad@cgiar.org* *www.cipotato.org* | *@cipotato* *@Cipotato* *@cip_cipotato*

CIP thanks all donors and organizations that globally support its work through their contributions to the CGIAR Trust Fund: www.cgiar.org/funders