

PROJECT STATUS REPORT (FINAL)

07/01/2021 - 12/31/2021

SECTION 1: PROJECT SUMMARY

Operation number: SU-T1111

Suboperation number: ATN/ME-17203-SU

Project Name: Precision Farming

Purpose:

Country admin:

SURINAME

Country beneficiary:

Suriname

Group:

C

SubGroup:

Executing Agency: Foundation Green Wings

Team Leader: VASHTIED

Score Image:

Total Score: 1.149

Project cycle:

Report Date: 2022-01-04

Approval Date: 2018-12-13

Signature Date: 2019-04-04

First Disbursement Date: 2019-07-09

Original Execution End Date:

Current Execution End Date:

Original Last Disbursement Date: 2022-04-04

Last Current Disbursement Date: 2023-01-04

SECTION 2: RESULTS AND ACHIEVEMENTS

Project's performance after finished

With the result of the activities done in period 2021 (season 1 and 2) We have demonstrate that we are able to deliver the service because of the knowledge and experience we have gained from this pilot and past project in spraying rice and and the demand to spray other crops Soursop, banana and Cherry. We also have gained experience from bottlenecks regarding, Battery management, Flight control systems failure, Calibration of systems GPS problems. With all these learnings we proofed that we can setup and scale a successful drone operation business. For the upcoming six months our priority is to strengthen our capacity on Technical staff and developing the business plan. Starting with the farmers' association representing 129 farmers registered in 4 different area in Nickerie. Activities in 2021- 2022, Data collecting for an agriculture drone Business model The main activities in 2021 (season 1 and 2) where planned to collect data for a sustainable drone agriculture service. 6 farmers of the 129 registered farmers from the small-scale producers association representing a total of 300 ha has been selected . From an economic perspective foliar application can reduce the excessive amount of granular urea use. Therefore it was critical to test the service including a total foliar program spraying with the drone. A foliar spraying program designed to reduce the urea was followed; 6 round spraying cycle with the following products max. concentration for Landamine Zn: 100 ml on 20 l. water concentration for Azavis MnZn: 500ml on 20 l water concentration for Kappa M: 100 gr on 20 l water concentration for Chelal Noor: 200 gr on 20 l water Type of drone used was The JTL 606 2o 1 drone is mainly used for spraying. The Drone has proven to be able to reduce the farmer labor time from 1 hour to 20 min per ha with a full battery capacity. Spray volume of 40 liters per ha. Drone seeding 40 min per ha including loading time of a 20 liter hopper. Seeding with the drone has been proven successful on small areas smaller than 1 ha. Delays in Activity season 1 and 2 (2021) Calibration issues of the Magnetic compass which is needed for GPS guidance of the drone failed during the project activities. False magnetic interference interrupts the calibration process of the drone. In this case several resets and recalibration with software has been done without any success. The Drone software uses the software farm assistant programmed on the K3A flight controller. K3APro flight control is specially designed for agricultural sprayer drones. It has a variety of modes and exclusive functions for agriculture sprayer drones. It supports manual, semi-autonomous and autonomous flight. It can monitor drug flow in real time and intelligently match the spray volume to achieve precise UAV pesticide spraying . Equipped with professional App ground control station, it is efficient and easy to operate. Several calibration attempt couldn't solve the problem. In January we contacted Joyance Technical assistant from the drone company assist in solving the problem The problems has not been solved and even results in a drone crash after the instructions. We have learned that a technical team is essential part of the operation to solve any technical issues immediately to prevent delays in spraying program The delay in delivery of Drone parts from manufacturer in China is an disadvantage. Therefore, we contacted Aquameyer Drone a Ghanaian Agriculture drone company with their head office in Germany. (AcquahMeyer DroneTech (amdronetech.com) Aquameyer has experience in leasing and training farmers to operate drones in Ghana and other countries in Africa Assembling agriculture drone in Suriname with prefabricated components will be more sustainable and guarantees a continuous service to farmers. During the pilot we had Drone Crash cause delay in the data collecting Nevertheless we have learned that delivering a service we should be able to operate with multiple drones in case of accidents which can cause delay in offering the service at a critical moment. Safety, Most of the small farmers' fields are bordered behind the houses densely populated areas. If the GPS control is lost, the Drone can go off course and fly towards the houses uncontrollably. Therefore we Drones with very reliable GPS Control system.

Supervision Team Leader comments

The project has performed very well despite setbacks and has been extended to facilitate completion of activities to maximize impact.

Final evaluation

The project has so far achieved significant results including: • The precision farming techniques used in this pilot project are scaling up to other sectors, because of this the total area of drone spraying has been increased from 20ha to 100ha. There is especially a growing demand to use the precision farming techniques for fruit and vegetable crops. The demand has become so high that the EA can't fulfill it with the existing equipment and is looking for opportunities to increase their capacity. • A complete foliar fertilizing program (sustainable fertilization of rice through foliar application to reduce the impact of urea on the environment) has been developed based on the reduction of 60% of urea. • A field station was established for gathering and processing agricultural data. The data collection system allows for monitoring of multiple environmental parameters involving a wide range of applications, from plant growing analysis to collection CO2 emission data.

Supervision Team Leader comments

Excellent engagement and commitment of the EA have contributed to satisfactory performance

SECTION 3: INDICATORS

C1 : Baseline and Farmer Engagement	Weight 25%	Qualification High Satisfactory			
C2 : Delivery of Ag Tech Services	Weight 50%	Qualification High Satisfactory			
C3 : Scaling and Sustainability	Weight 25%	Qualification Satisfactory			
Milestones	Planned Value	Achieved Value	Due Date	Achieved Date	Status
Conditions Prior	1	1	2019-10-01	2019-06-17	Achieved
Farmer Enrollment	20	20	2020-06-30	2020-02-17	Achieved
Data System implemented	1	1	2020-06-30	2020-08-03	Achieved
Assessment Report on Participating Farmers	1	1	2021-03-31	2020-03-30	Achieved
Enrollment of additional farmers	20	20	2020-09-30	2020-02-17	Achieved
Business Model for Sustainability of Service Delivery is designed	1	0	2021-09-01		Overdue
Case Study shared with 3 institutions	3	0	2022-02-01		Overdue
Business Model for Sustainability of Service Delivery is designed	1	0	2022-06-30		Pending
Case Study shared with 3 institutions	3	0	2022-12-31		Pending

Critical facts that have affected project's performance

Others, Which?

COVID 19 reduced mobility and generated delays in supply chain for key parts needed for drone repair

SECTION 4: RISKS

	Impact Area	Severity	Prob.	Date	Responsible	Mitigation action
Lack of Organization of beneficiaries	Final Outcome, Baseline and Farmer Engagement	(2) Low	Low 40%	2021-03-04	Executing Agency	Green Wings will adopt a phased approach to farmer engagement, starting with the innovators and leaders amongst small scale rice producers, as identified by the Rice Research Institute in Nickerie, ADRON. It is expected that these early adopters will be the agents of change in adoption of precision agriculture, will encourage others to participate in the project.
Negative impact of external players on water quality.	Final Outcome, Scaling and Sustainability	(3) Medium	Low 40%	2021-03-04	Executing Agency	The IDBG has approved a loan for Suriname that will include organization and regulation of water boards that are responsible water channel maintenance (SU-L1052). Green Wings will monitor practices in or near the targeted rice fields, will engage with other actors involved in local water channel maintenance and will coordinate with the authorities in charge of executing the loan SU-L1052 in the field
Lack of consensus on the agro-chemical	Final Outcome, Delivery of	(3) Medium	Very Low	2021-03-04	Executing	Green Bourne NV, the parent company of Green Wings, is a small-scale niche agro technology service provider that has been active in promoting sustainable agro inputs in Nickerie. The company has gained some recognition and trust amongst small producers and will

that will be used in electrostatic drone	Ag Tech Services		20%		Agency	work through Green Wings with the early adopters most committed to best production practices to influence the adoption of sustainable agro inputs for electrostatic spraying.
Climate Change.	Final Outcome, Scaling and Sustainability	(4) High	Low 40%	2021-03-04	Executing Agency	This is an external risk that is difficult to mitigate beyond advising on climate resilient practices but will be monitored to assess any impact on project outcomes.
Farmers lack of awareness and trust on the new precision agriculture model.	Final Outcome, Delivery of Ag Tech Services	(4) High	Low 40%	2021-03-04	Executing Agency	he project will use voices of early adopters and focus on time savings as a primary benefit of precision agriculture which will allow participating farmers to diversify their activities and income streams. In addition, Green Wings will seek to work with early adopter farmers willing to participate in field demonstrations to showcase results to others, will facilitate exchange visits to Brazil to highlight the benefits achieved by rice farmers using precision agriculture in that country, and will also produce video materials that make the case for change.
Use of hazardous chemicals	Final Outcome, Scaling and Sustainability	(4) High	Very Low 20%	2021-03-04	Executing Agency	To ensure that the agro chemicals used in the project comply with the IDBG's List of Excluded Activities (specifically relating to pesticides and herbicides), Green Wings will use a documented system for traceability and third-party confirmation. In addition, all cannisters and other materials for disposal will be managed in accordance with national requirements as well as good practices employed in the wider region.
Institutional Risks	Scaling and Sustainability	(2) Low	Low 40%	2021-03-04	Executing Agency	As Green Wings is a small organization established in 2018, project resources have been budgeted for a strong full-time project implementation team including a technical coordinator an agricultural lead a technology lead and a project administrator. In addition, Green Wings will receive support on a part time basis to ensure that required levels of fiduciary management are maintained
TOTAL RISKS QUANTITY: 7		IN EFFECT RISKS: 1		NOT IN EFFECT RISKS: 0		MITIGATED RISKS: 6

SECTION 5: SUSTAINABILITY

Indicate likelihood of project sustainability after project completion: HP

Justification:

So far the demand for precision farming techniques in country have exceeded the projections. The EA is scaling up to other agricultural crops as well. This project can be seen as phase 1 and created a baseline for phase 2 from which , dryers and storage facilities can be developed for the benefit of the smallholder producers. Funds will be sought from Financial and Strategic investors to enable a Structured Project Finance transaction to be established. This will be linked to marketing arrangement for finished, polished, white rice where the balance sheet of the offtaker provides security for the Capex and Opex funds. Furthermore the EA is building its network and connections in the region and Europe leader to more potential investors in the project.

[There were no aspects reported during this period]

Actions related to sustainability which have been implemented in the project:

1. There is a business model for sustainability designed. 2. To strengthen the team Green Wings requested support from IT Core team Suriname (www.it-core.org) to establish a mutual corporation sharing knowledge of flight software programming. Based on lessons learned during the project assembling agriculture drone in Suriname with prefabricated components will be more sustainable and guarantees a continuous service tor farmers. The service model based on a 5 year projection, will be developed into a model in which leasing of a agriculture spraying drone to farmers becomes part of the service. Therefore, Aquameyer Drone was contacted a Ghanaian Agriculture drone company with their head office in Germany. (AcquahMeyer DroneTech (amdronetech.com) Aquameyer has experience in leasing and training farmers to operate drones in Ghana and other countries in Africa. 3. Case studies will be conducted on key products such as Agriculture Drone operation in rice production Nickerie; Remote sensing in rice cultivation; Foliar application with Drones in collaboration with the Polytechnic College Suriname and the Anton the Kom University for further scaling of the project.

SECTION 6: KNOWLEDGE

Relative to Author Date

Choosing the right Drone was a challenge, because the type of drones have to meet various requirements to function in Suriname without any problems. 1 No flight zone issues The Mapping Drones. Since the rice field chosen within a 5-mile radius are in the No Flight zone, special authorization is needed to be able to map. Authorization from the Drone dealer to unlock the flight zone program of the drone was required. 2.Spraying Drones Some lessons we have learned with the spraying drones are the technical modifications wich we had to do on the drone.The drones had to be reprogrammed in order to be able to communicate with the satellites for precission spraying.The design of rice fieldsin Asia where these drones are used for spraying differs with Suriname in length. In suriname, the areas are longer in length, so the performance of the drones did not fully meet the conditions to operates .We have installed cameras on the Drones so that it can be flown at further distances.

Implementation Ken Doorson 2020-03-30

Land preparation Increasing the production due to better land preperation a typical rotary has to be deployed supplied by fernandes agro Nickerie. Normally the rice fields in Nickerie are a 4 time land preperation process but with the implementation of the new tiller rotavator the process will reduced to 2. The common problem of the rice field is that there are not leveled and it decreases the production with 20 to 30 %. This also means the the farmer need an excessive amount of water and seeds to cover the field. Electrochemical Soil testing Soil samples that have already been taken from the fields were scanned with the electrochemical soil tester for the main trace elements (NPK).

Implementation Ken Doorson 2020-03-30

Before using the Agriculture spraying drone it will be of importance to map the rice field using mapping drones with Real time kenetic (RTK) technology. The Real time kenitic technology is used to be able to transfer accurate GPS coordinates to the spray drones. A deviation or inaccurate GPS coordination could result in a deviation of spray pattern during autonomous spraying function. Mapping RTK is an acronym for Real Time Kinematics and as the name suggests, this process happens in real time. A base station (GNSS receiver) is set up and so has a known location while a 'rover' is installed into the airframe. Signals are sent between the ground station, the drone and the satellites and any anomalies in actual location are corrected 'on the fly' so to speak. Latitude, longitude and altitude information is recorded when the shutter of the drone camera activated and this information is embedded into the image data for processing.

Implementation Ken Doorson 2020-03-30