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ATSAF - CGIAR++ Junior Scientists Program Final Report

Name of student: Sophia Bothe
University: Martin-Luther University Halle
Supervisor at University: Prof. Dr. Folkard Asch, Prof. Dr. Marcel Quint
International Agricultural Research Center: International Potato Center (CIP)
Country: India
Supervisor at IARC: Prof. Dr. Jürgen Kroschel, Dr. Brijesh Kumar
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Internship Report

International Potato Center Guwahati, India

Intern
Sophia Bothe
Martin-Luther University Halle
s.bothe@posteo.de

Project-Supervisor
Prof. Dr. Jürgen Kroschel
International Potato Center, New Delhi
juergen.kroschel@cgiar.org

Dr. Brijesh Kumar
International Potato Center, Guwahati
brijesh.kumar@cgiar.org

CIP INTERNATIONAL POTATO CENTER
A CGIAR RESEARCH CENTER

ATSAF

UNIVERSITY OF HOHENHEIM

MARTIN-LUTHER-UNIVERSITÄT HALLE-WITTENBERG

Abstract

This report details an internship at the International Potato Center in Guwahati, India where I went to provide data for my master thesis in Crop Science. The thesis is about the advantages and disadvantages of the potato cultivation in zero tillage practice with rice straw mulching of farmers in the northeastern state Assam. I spent five months in this area to collect data, interview farmers and get to know the field conditions of this new method of potato cultivation.

Introduction

To collect data for my master thesis I did a five-month internship (1st December 2018 – 30th April 2019) at the International Potato Center (CIP) in Guwahati, Assam, India. This office was established in August 2018 by the Indian headquarter of New-Delhi for a five-year Potato Value Chain Program: Improving farmer's livelihoods through sustainable intensification and diversification of agri-food systems with climate-smart potato technologies. The program was founded by Professor Jürgen Kroschel and is located together with the Rural Infrastructure and Agricultural Services Society (ARIASS) that proposed the state governmental project titled as Assam Agribusiness & Rural Transformation Project (APART). The CIP is mainly involved as a knowledge partner.

Currently there are considered five modules at this program (i) Value chain development, ii) Varietal selection, introduction and seed production, iii) Demonstration of sustainable climate resilient production practices, iv) On-farm post-harvest management and v) Enterprise development. My work took part at the Sustainable Intensification of Rice-Potato Cropping Systems, solely in the new practice of zero-tillage potato cultivation plus rice straw mulching.

My main task was to visit as many farmers as possible who cultivated potato under zero tillage practice in seven districts all over Assam, to observe the plant development and ascertain occurring challenges. After a growing season of 90 – 120 days I collected potato samples to determine the yield of marketable, non-marketable and green tubers. Furthermore, I did an interview with farmers about their experiences with the practice of zero tillage with rice straw mulching in potato cultivation.

Scientific background

In the state of Assam, about 86% of its rural population is dependent on agriculture, fisheries and forest. Potato is one of the most important crops grown in Assam. However, low crop productivity of less than 10 tons/ha is far below the national level (23 tons/ha) and the crops' yield potential, and not sufficient to meet local demand, thus requiring additional imports from other states.

Potato is grown during the winter rain-fed *rabi* season from October/November until February/March. It is planted after rice, taking advantage of remaining soil moisture.

The idea of zero tillage in potato cultivation is to save water and time for economical advantages. The ploughing of heavy soils causes flooding of the fields due to the saturated soil through the summer rainy season. Potato farmers must wait up to three weeks, before they can plant the potato without any risk of rotted seeds. In zero tillage practice farmers plant the potato immediately after the rice harvest and straw cutting. The rice straw, that has no purpose in most of the cases is used as a cover for the tubers to protect it from sunlight and prevent greening.

Methods

The practice of zero tillage in potato was scheduled in seven districts with 70 demonstrations in total. The cultivation, fertilization, plant protection and crop management, as well as the seeds were provided by the international potato center. The lay outing and monitoring were done by the people from the department of agriculture (DoA) and the farmers. Beside the practice of zero tillage a control plot of conventional tillage was designated. For each plot one repetition was arranged. Two varieties (*Kufri Pukhraj* and *Kufri Jyoti*) with different maturation times were used. The whole trail plot for every demonstration was designated with 1500 m², that means two times 187,5 m² for each treatment and each variety.

The first purpose of my work was to investigate the plant development in nine demonstrations during the whole growing season. In the first week of December I chose the fields that I was about to maintain every second week together with one of my colleagues from the office. We did the selection respectively to the best designed plots and small distances to one another. From the second week of December until the first week of February I measured canopy cover,

plant height and plant density. I determined the number of stolons, the number of emerged plants and the BBCH-stadium and collected data about the general field information in eight demonstrations located in three districts. After almost two months it turned out that it is not possible to measure all the fields every second week, still due to long distances between the demonstrations, bad road conditions, and little time in the field. For this reason I changed the plan for my master thesis together with my mentor Prof. Juergen Kroschel. Now I was about to visit as many fields as possible during the harvest, to collect yield data. Moreover, I did a questionnaire with as many farmers as possible, immediately after the harvest, to learn about their advantages and disadvantages and their experiences with the practice of zero tillage plus rice straw mulching in potato cultivation.

In 18 demonstrations, distributed over six districts I measured the marketable, non-marketable and green tuber weight and counted the tubers per plant at the day of harvest. With the help of officers and assistants from the DoA, as well as from the farmers I could collect yield data of two demonstrations on one day if the fields were nearby each other. The data of seven demonstrations was provided by the officers responsible for that district, because I was not able to join in at the day of harvest. At the end of the potato season (15-03-2019) I had yield data from 25 demonstrations and responded questionnaires of 27 farmers.

The results will be compiled in Germany, as well as the finalization of the thesis.

Reflection

Working together with farmers, people from the DoA and CIP brought different challenges I had to face. The first issue I realized was the low conscientiousness of people from the department of agriculture. Only a few demonstrations were in a good condition and designed as scheduled. Most of the farmers did not receive enough information and did not follow the recommendations to lay out the demonstration. Almost every field was smaller than designated, the fertilization was done roughly, they changed the plant density and the plot arrangement. Only two farmers out of the 25 from whom I took the yield data had a repetition of the treatment. Some farmers were afraid of losing yield and using too much area for this new cultivation practice.

Seeds, fertilizer and plant protection were provided and dispensed for 70 demonstrations from the CIP to the DoA, but only 40 farmers received these materials to cultivate the demonstrations. Some of them only got one variety of seeds. It is not known what happened to all the other resources, so that we have to suppose a case of corruption. Many people are working in the department of agriculture in India and there is a huge hierarchic system, thus holding someone accountable resulted fairly complicated.

At first, I wanted to monitor and compare the plant development of potatoes grown in zero tillage and conventional tillage practice during the whole growing season. Soon it turned out, that it is not possible to measure nine demonstrations every second week. I reduced the number of demonstrations but anyway the distances between farmers' places were too big or the road conditions were bad, so that I spent a lot of time traveling. Moreover, the sunset was at 4.30 pm and I had only little help from my colleagues or the officers in the field to ascertain all the data. Additionally, to monitor the development of potatoes, the plant should be screened weekly, in order to intervene in nutrient deficiency or pest infestation in time.

When the plans for my thesis changed and I decided to gather yield data, I wanted to participate every 25 harvests. Unfortunately, some farmers could not wait due to the approaching pre-monsoon period, thus I have to trust the data that was provided by the people from the DoA.

Another main problem was the communication with farmers and DoA officers. For the interview the officers of the DoA translated for me and the farmers, but their English was rather poor. Sometimes I doubted if they translated honestly.

In the conclusive questionnaire 26 out of 27 farmers said that they will continue with the practice of zero tillage in potato cultivation, because less time is required. But the main part of the results will be elaborated back in Germany.

As my decision to join in this project was very short-termed, I did not receive detailed information about the project and I could hardly prepare my work. Immediately after my arrival we started the field visits, because some farmers had already planted. To accustom to the new environment and culture I highly recommend arriving at least two weeks before the work starts.

My contract with the CIP said that they will provide my travel costs for the work within Assam. They did not mention, that this was only the case if I travelled with CIP people. Hence, I had to pay the travel costs by my own when no one could join me in the field. That was approximately 10 000 INR (125 EUR) for a two days journey, excluding accommodation. This issue was very complicated and exhausting to discuss repeatedly.

The reason why I did not finish the results in India is because it was hard for me to work in the CIP office Guwahati. At the beginning my colleagues were very caring, sometimes a little to much. As the only woman in my office I felt uncomfortable and I had problems to adapt with the socialization of men patronizing women. Often, I felt misunderstood and bothered by my Indian supervisor. He did not speak English very well; his expertise was not helpful to me and he should have treated me more professional. For a time, I really hesitated if I would be able to work with these people, to stand the project and write a thesis about it. This was the reason why I decided to finalize the results in Germany. I used the last weeks in India to explore some other sides of the country, which I highly enjoyed.

Beside all these complications I highly enjoyed every field trip. I felt very honored by the warmly and joyfully welcoming of the village people and especially of the farmers' families. Every time I visited the fields many folks from the village came to meet me. I got traditional Assamese presents, was invited to the farmers house for a cup of tea or sometimes a whole meal and I had to take a lot of photos.

To work and live in India was a big personal challenge for me, but in the end, it was a great experience that strengthened my personality and expanded my view on this world and related problems.