

August 16, 2016

Comparative Study on Different Fertilizer Recommendation Practice

In order to ensure soil fertility, GISBL and Solidaridad Network Asia devised a field test based study to compare different fertilizer application practices and determine the optimum result driven recommendation service. This study was conducted in two regions, Jessore and Khulna over the period of two seasons: Rabi, 2015 and Kharif 2016. Identified the worked together. Three different practices of fertilizer application were adopted and mrittikā was one of the sources for fertilizer recommendation. This study finds that among all three different practices, in each indicator, mrittikā produces positive results for farmers.

1.0 Introduction:

Soil fertility is a scorching concern in Bangladesh and with every progressing day, it is deteriorating due to indiscriminate usage of fertilizer and chemicals. Grameen Intel and Solidaridad Network Asia have started working together on this critical issue. This joint initiative started with signing of an MoU followed by a field piloting at Jessore and Khulna regions. Solidaridad Network Asia introduced soil test based fertilizer recommendation practice using Grameen Intel's fertilizer recommendation software mrittikā. The field piloting was conducted on selected vegetable crops, namely Brinjal, Tomato and Cauliflower.

2.0 Objectives:

The pilot project intended to find out the effectiveness of mrittikā based on attributes such as optimum amount of fertilizer recommendation, cost effectiveness, crop productivity and conservation of soil health. Specific objectives of the pilot were:

- a) To identify the present status of major soil nutrient
- b) To suggest optimum/appropriate amount of fertilizer as per crop requirement
- c) To identify effective method of fertilizer recommendation
- d) To identify amount of fertilizer cost reduction
- e) To reduce use of chemical fertilizer and contribute for soil health conversation

3.0 Methodology:

In order to make the pilot finding useful and convincing a comparative method was used on the field. Three different fertilizer recommendation methods were applied on the selected crops. Before field implementation Grameen Intel conducted ToTs for capacity building of the project personnel, soil sample collection and soil tests at project locations in collaboration with Solidaridad project offices at Jessore and Khulna.

3.1 Capacity Building: Five staffs of SaFal project of Solidaridad Network Asia were trained by Grameen Intel on soil test, soil sample collection and the use of mrittikā.

3.2 Demonstration plots: The piloting took place at Jessore and Khulna district. SaFal project's trained staffs selected 20 vegetable farmers. Soil samples were collected from the plots of the selected farmers and these plots were used as demonstration plots. The plot locations and breakdown are as below:

- Dumria upazila- 10 selected farmers participated with demonstration plots
- Monirampur upazilla- 8 selected farmers participated with demonstration plots
- Abhynagor upazila- 2 selected farmers participated with demonstration plots

3.3 Comparative fertilizer recommendation methods: The selected demo plots were well ploughed and the below fertilizer recommendation methods were used to apply fertilizers across the crop lifecycle:

- i. **mrittikā recommendation-** Grameen Intel’s fertilizer recommendation app
- ii. **BARI recommendation-** BARI (Bangladesh Agriculture Research Institute) fertilizer handbook
- iii. Farmer’s **traditional practice**

One decimal of land was laid out for each fertilizer recommendation method on each demo plots. The following crops were cultivated in that one decimal land using the above mentioned fertilizer recommendation methods. However, among the 20 selected plots, 3 plots were damaged due to blight and virus attack during the season.

Crop Name	Seed Variety	Number of plots
Brinjal	China-3	13
Cauliflower	Anokhi	4
Tomato	Aghrani	3

3.4 Monitoring and assessment: Time to time field monitoring was conducted by the farmers, field organizers, technical officers and program officers of SaFal project. Different plant growth parameters such as height, leaves, branch etc. were collected on 20 days interval; and the harvest data was collected twice per week during crop harvesting.

4.0 Assessment focus:

The following areas were given primary attention and the results were collected from the demo plots fertilizers were applied following the above mentioned methods.

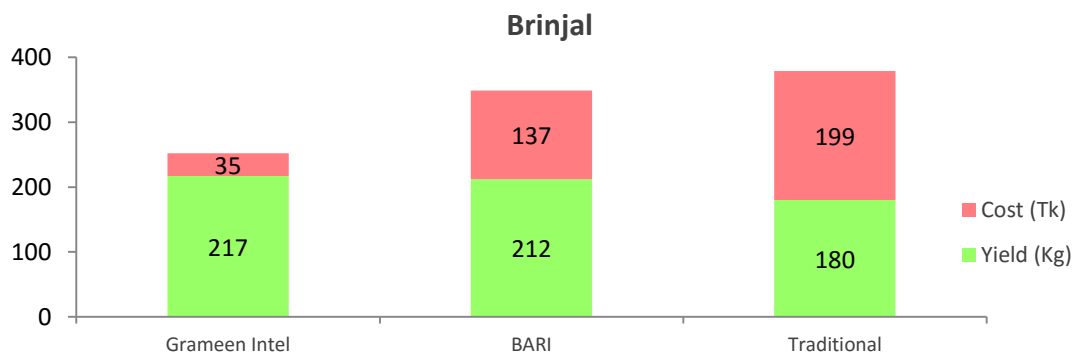
- 1. Primary focus:**
 - Yield per decimal (Kg)
 - Cost per decimal (BDT)
- 2. Secondary focus:**
 - Number of leaves per plant on/after 20 , 40 and 60 days of transplanting
 - Plant height (cm) per plant on/after 20 ,40 and 60 days of transplanting
 - Number of Branches per plant on/after 20 ,40 and 60 days of transplanting

5.0 Result assessment of fertilizer recommendation methods:

This section focuses on crop wise yield and fertilizer cost incurred after using the fertilizer recommendations given by mrittikā, BARI handbook and according to traditional practices respectively.

5.1 Brinjal:

In case of Brinjal, thirteen demo plots were established for the season during October to December 2015.

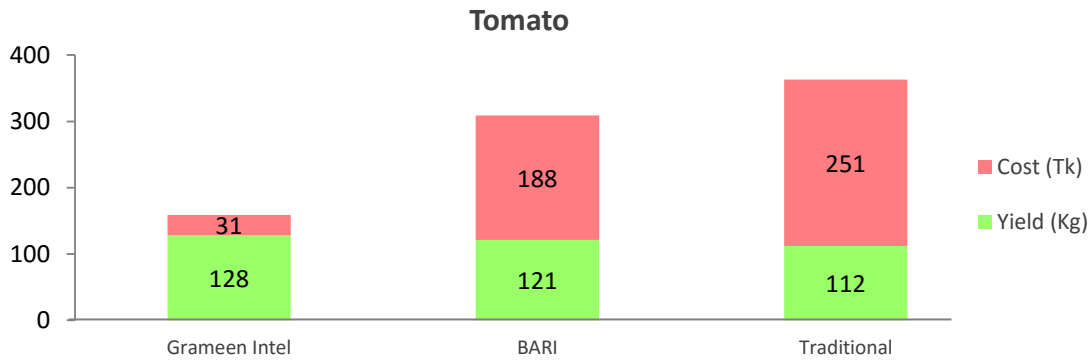


Graph 1- Cost and yield situation across different fertilizer recommendation for Brinjal

Following mrittikā's recommendation farmers obtained the highest yield than that of BARI handbook recommendation and traditional practice. Average yield for Brinjal after using mrittikā's fertilizer recommendation was 217 kg per decimal, which is 2.3% and 20.5% higher than that of BARI handbook recommendation and traditional practice respectively. Moreover, there was significant amount of input cost reduction as well. Use of mrittikā recommendation resulted in the least cost for fertilizer use. Fertilizer cost according to BARI handbook recommendation and traditional practice were 29% and 468% higher respectively than that of mrittikā's recommendation.

Tomato:

For Tomato three demo plots were established on November’ 2015. However, one plot was damaged due to late blight and the remaining two plots were partially affected due to sudden fluctuation of temperature. Even on this condition positive effects were visible on vegetative growth stage of tomato where mrittikā recommendation was applied compared to others recommendation methods.

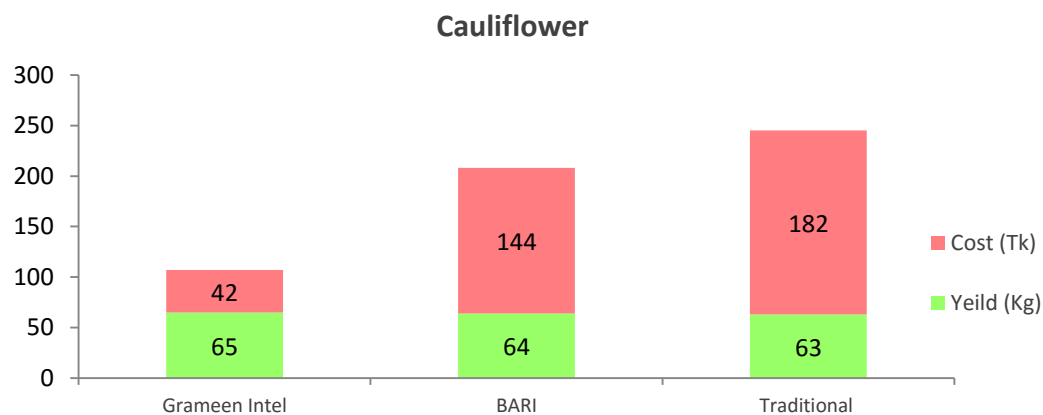


Graph 2- Cost and yield situation across different fertilizer recommendation for Tomato

As graphically presented, the plots using mrittikā’s recommendation have achieved the highest yield per decimal. Average yield from using mrittikā’s recommendation was 128 kg per decimal, which is 5.8% and 14.3% higher than BARI handbook recommendation and traditional practice respectively. Again, there was a significant difference in the input cost incurred among these methods, for instance fertilizer cost incurred using mrittikā’s recommendation was 506% and 709% less than that of BARI handbook recommendation and traditional practices respectively.

Cauliflower:

Four demo plots were established during September to October 2015 for Cauliflower and all the plots were in Khulna region.



Graph 3- Cost and yield situation across different fertilizer recommendation for Cauliflower

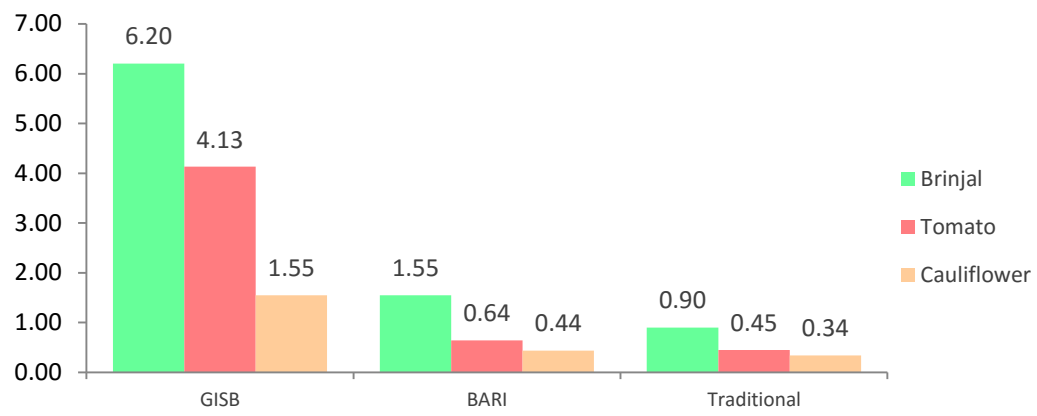
The graph indicates that yield achieved per decimal was almost similar across different fertilizer recommendation methods. However; the crop yield obtained following mrittikā’s

recommendation was still 1.5% and 3.2% higher than that of BARI handbook and traditional practices respectively. Moreover, the fertilizer cost was consistently low like other crops. Costs incurred using GISB fertilizer recommendation was 242% and 333% less than that of BARI handbook recommendation and traditional practices respectively.

6.0 Conclusion

It was evident that use of mrittikā's fertilizer recommendation was effective because of:

- a) **Higher yield per decimal:** The yield after using mrittikā's recommendations were higher for per decimal of land compared to other fertilizer recommendation practices.
- b) **Significant reduction in input (fertilizer) cost:** Use of mrittikā recommendation resulted in maximum 400% (plus) reduction in fertilizer cost for the selected crops. mrittikā's suggestion for applying optimum quantity of fertilizer contributed for this significant reduction. Lesser amount not only resulted in the reduction for the cost for fertilizers but also is contributing for the conservation of soil health because of less chemical use on fields.
- c) **Higher return on investment on fertilizers:** Use of mrittikā's recommendation obtained higher yield for per taka spent on fertilizer compared to other methods. The yield to expenditure ratio for all the crops produced the same result although the amount varied from crop to crop. Such as for Brinjal use of mrittikā resulted in 6.2 kg yield for per taka spent on fertilizer; whereas the yields were 1.55kg and .09 kg obtained from other methods against per taka spent on fertilizer. Evidently mrittikā had higher return.



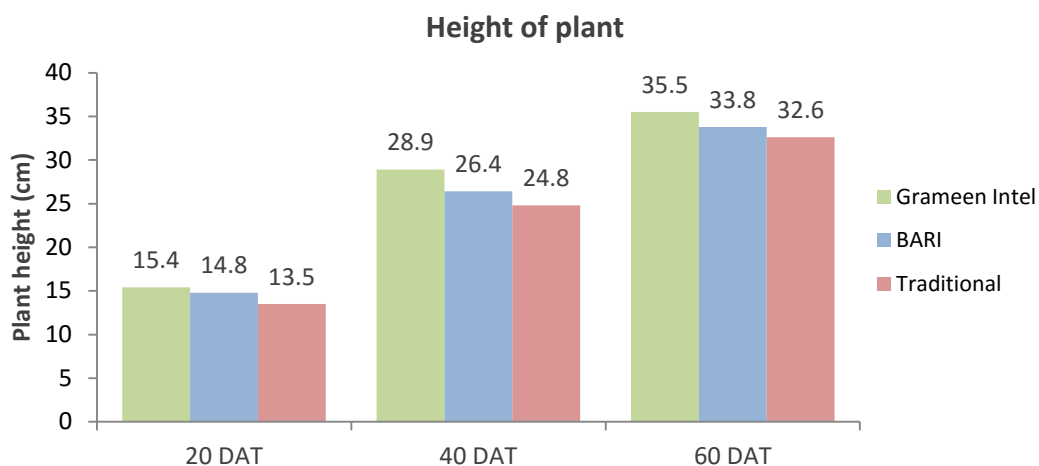
Graph 4- Comparative yield to expenditure ratio for Brinjal, Tomato and Cauliflower

APPENDIX

Important plant growth parameters on/after 20, 40 and 60 days after transplanting (DAT); and the comparative status across the three different fertilizer methods used are given below:

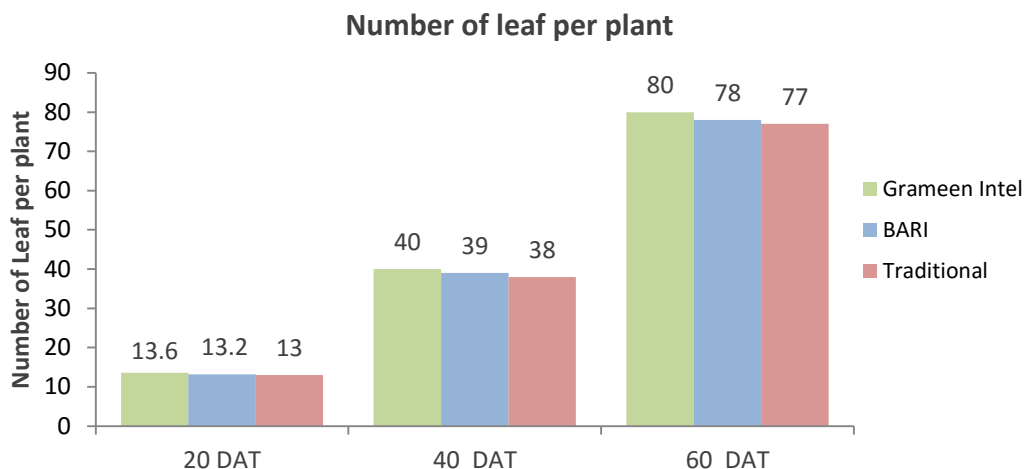
Brinjal:

a. Plant Height (cm)



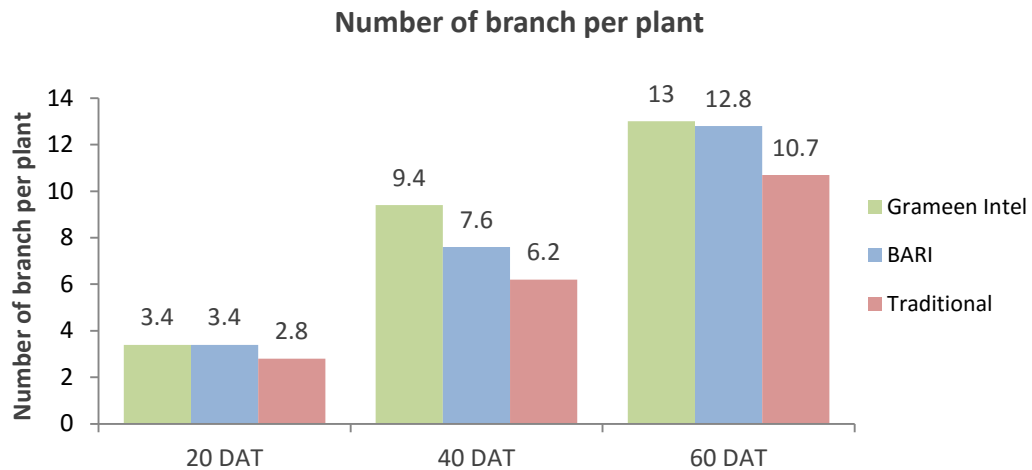
Maximum height of plants was found for the plants following mrittikā's fertilizer recommendation and minimum found with usage of farmer practice.

b. Number of Leaf per Plant



Maximum number of leaves was found with the use of mrittikā's fertilizer recommendation and minimum found with usage of farmer practice.

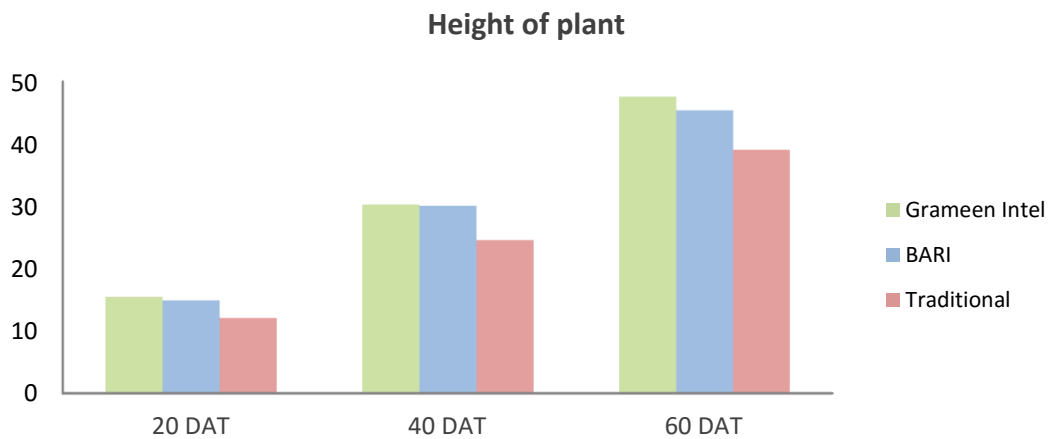
c. Number of Branch per Plant



Maximum numbers of branches were found with the use of mrittikā's fertilizer recommendation and minimum found with usage of farmer practice.

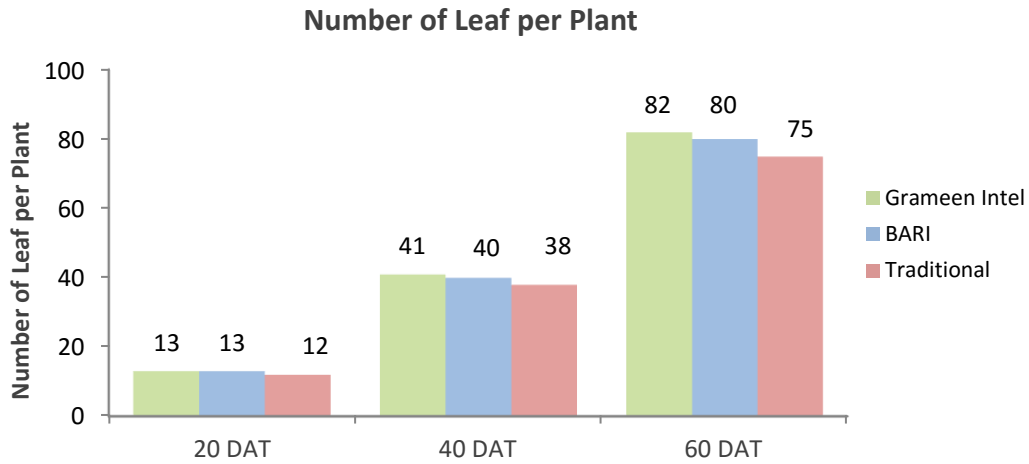
Tomato:

a. Plant Height (cm)



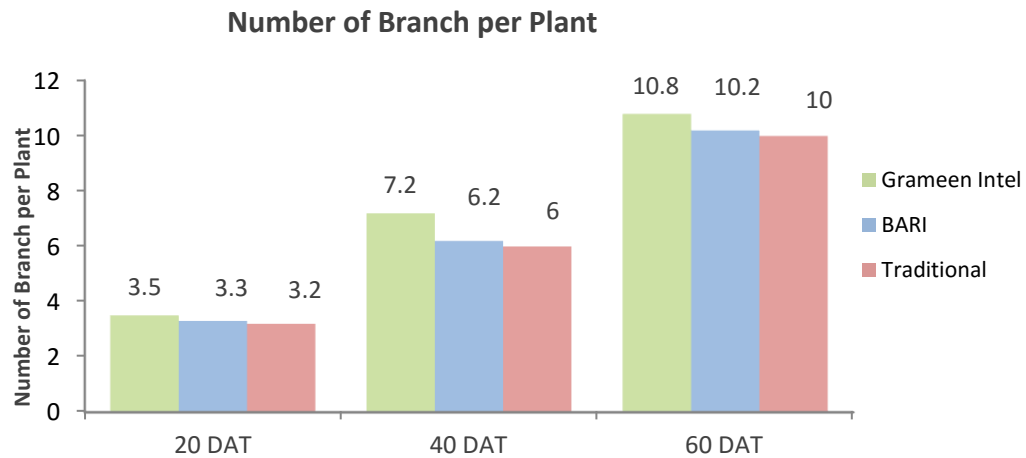
Maximum plant height was found for crops following mrittikā's fertilizer recommendation compared to BARI recommendation and farmer practice.

b. Number of Leaf per Plant



Maximum numbers of leaves has been found for the plants using mrittikā's fertilizer recommendation and minimum have been found in the traditional practice.

c. Number of Branch per Plant



Maximum numbers of branches have been found for the plants using mrittikā's fertilizer recommendation whereas the minimum have been found for the traditional farmer practices.