**Child’s guide in using LP to develop alternate farm plans for RAWE 2013 students**

HS Roopa and Kiran Patil, PhD Scholars, Dept of Agri Economics, UAS Bangalore

mandyaroopa@gmail.com,kiranecon@gmail.com

Dear RAWE 2013 batch students, it is our pleasure to provide you the following steps / tips to enable you to understand, appreciate and learn in a friendly manner the use of LP in developing alternate farm plans. We are sure you will learn this and appreciate how LP can be both a descriptive (positive economics) and a prescriptive (normative economics) tool for the benefit of our farmers. We have tried our best to provide you a child’s guide to use LP using your data. You can contact us any time by email if you still have doubts. Take this sincere opportunity our Department of Agri Economics is offering you in making you learn and appreciate this technique for your knowledge as well as for the betterment of farmers. We have also provided you screen shots in LP and to add Solver which will further facilitate your understanding. If you still have doubts send us an email and we will try to help you. You may also contact your RAWE teachers.

From the Master sheet you have tabulated the data in MS Excel, tabulated sheet, condense the data as required for LP formulation detailed below.

Step 1: Work out the total cost for each activity. Add all the material cost and labour cost.

Step 2: Work out the returns by multiplying total output from each activity with the selling price ( or market price)

**Step 3: Work out Net returns** (total returns - total cost ) which constitutes the objective function coefficient.

**Step 4: For input output coefficient:**

With the available data, get the resource or input required to produce output for one acre of land. We still prefer using acre rather than hectare because you can get the feel for the data and more than 80% of the holdings belong to small category (below 5 acres).

Example: If a farmer is cultivating ragi in 2.5 acres of land, if the total labour required is 60.

With this data, condense it to labor per acre = 60/2.5 = 24 mandays. Similarly calculate the input per acre for water (acre inches), Fertilizer (Kgs) etc

Step 5: Arrange the collected data in the format as shown in sheet1:

* Column A: gives the particulars of the data

Such as the input description, minimum subsistence requirement.

* Column B to Column I: indicates the values for the particulars.

Resource requirement for the crop or enterprise and minimum resource for subsistence

* Row 4 : indicates the crop or enterprise (Decision variable)

Such as tomato, capsicum…..dairy

* Row 5: Is representation of same (For ease)

For simplicity

* Row 6: Net returns realized from crop or enterprise.

Indicates the profit (total return-total cost) for individual crop or enterprise (Per unit)

* Row 7 to Row 11,: is the input- output matrix for the crop and enterprise

Gives the quantum of the resource required(used) for particular crop or enterprise.

* Row 12 to Row 15: minimum requirement for subsistence
* Column J: Symbolic representation to link constraints.

Indicates how each required resource is linked with the available resource.

* Column K: Resources available with farmers.
* Cell K7 to K 13 are ‘at least constraint’ which is represented by >=
* Cell K12 to K13 are ‘at most constraint’ which is represented by <=
* Cell K14 to K15 are ‘equal constraint’ which is represented by =

Create row and column as shown in the sheet 2.

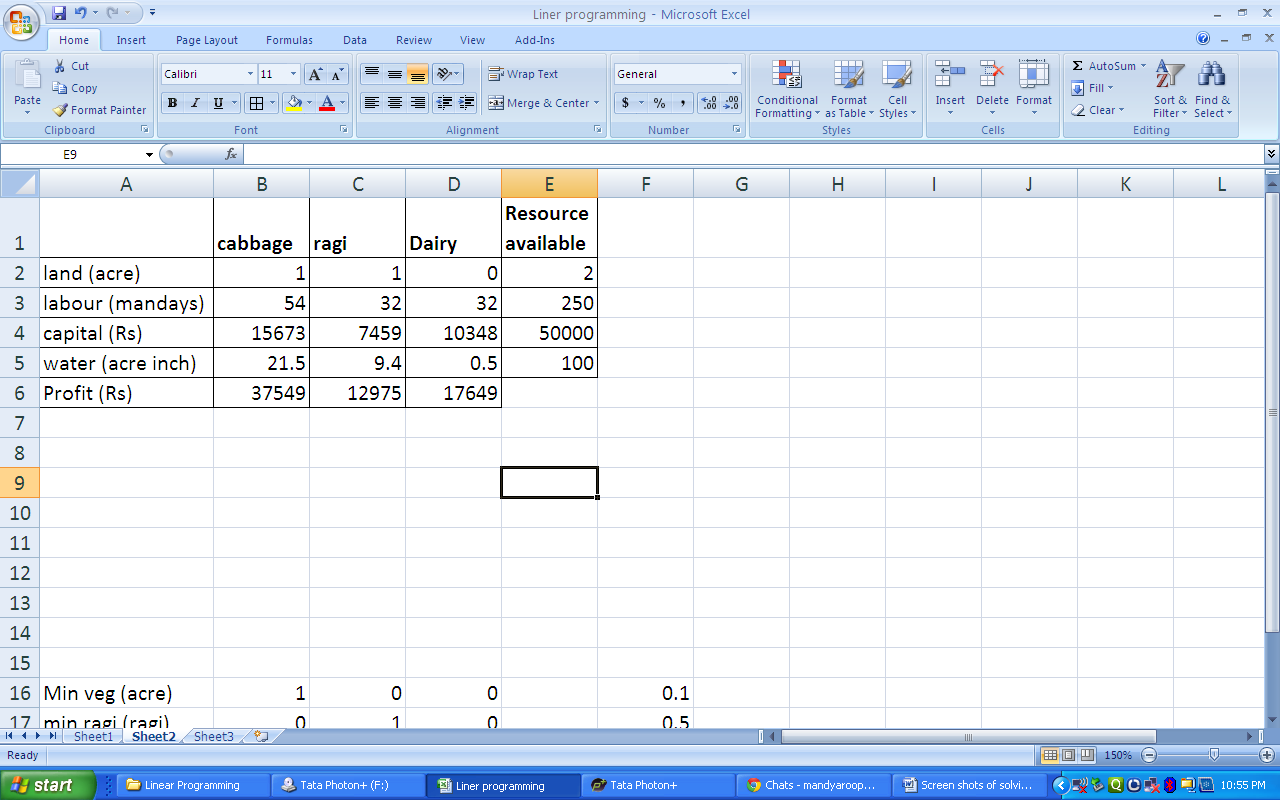
* In Column J, do insert ‘= sumproduct (……….,……..)’ formula.

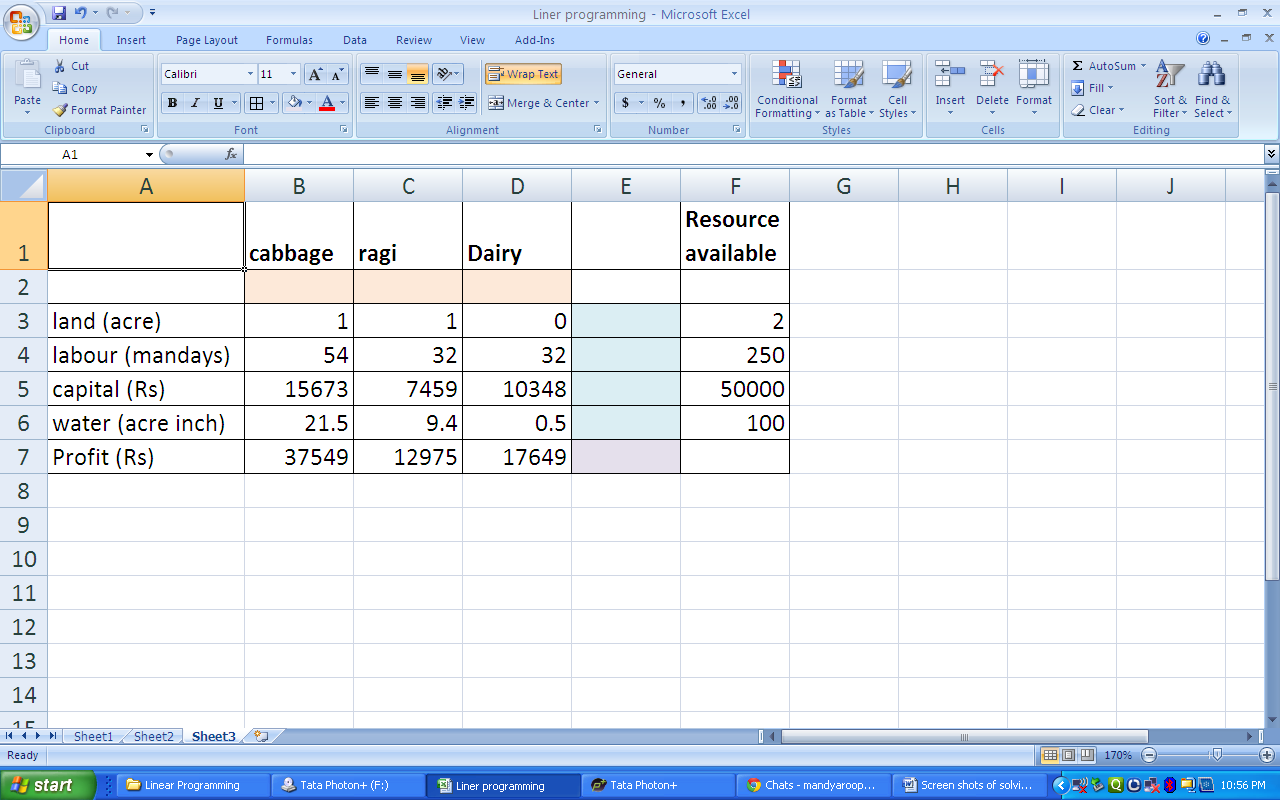
Run solver. Follow the screen shots in the file attached and solve for your data set.

Note: the example is different in the screen shots. Just follow the solver procedure and ignore the data in screenshot. If Solver is not installed in your Excel, please check the screenshot for solver addin.

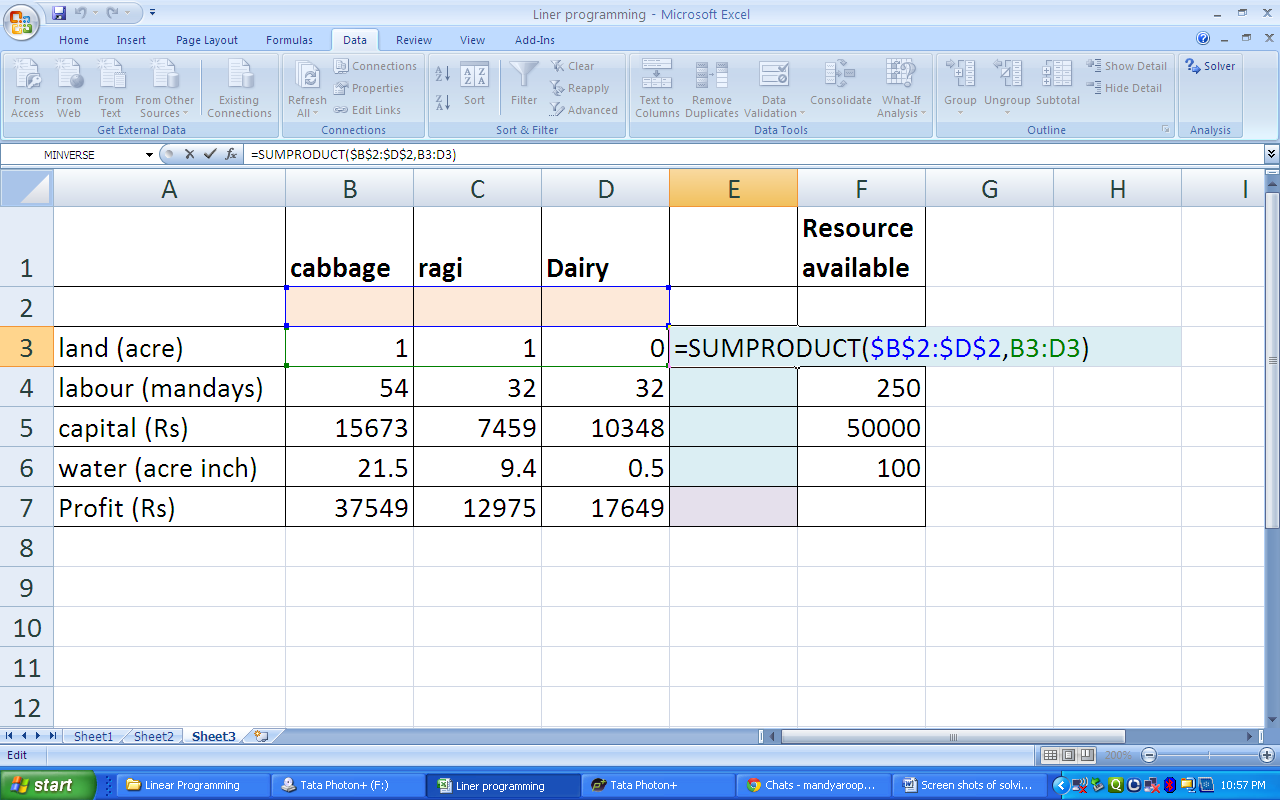
**Screen shots of solving linear programming problem in Excel through solver**

Base data for the programme

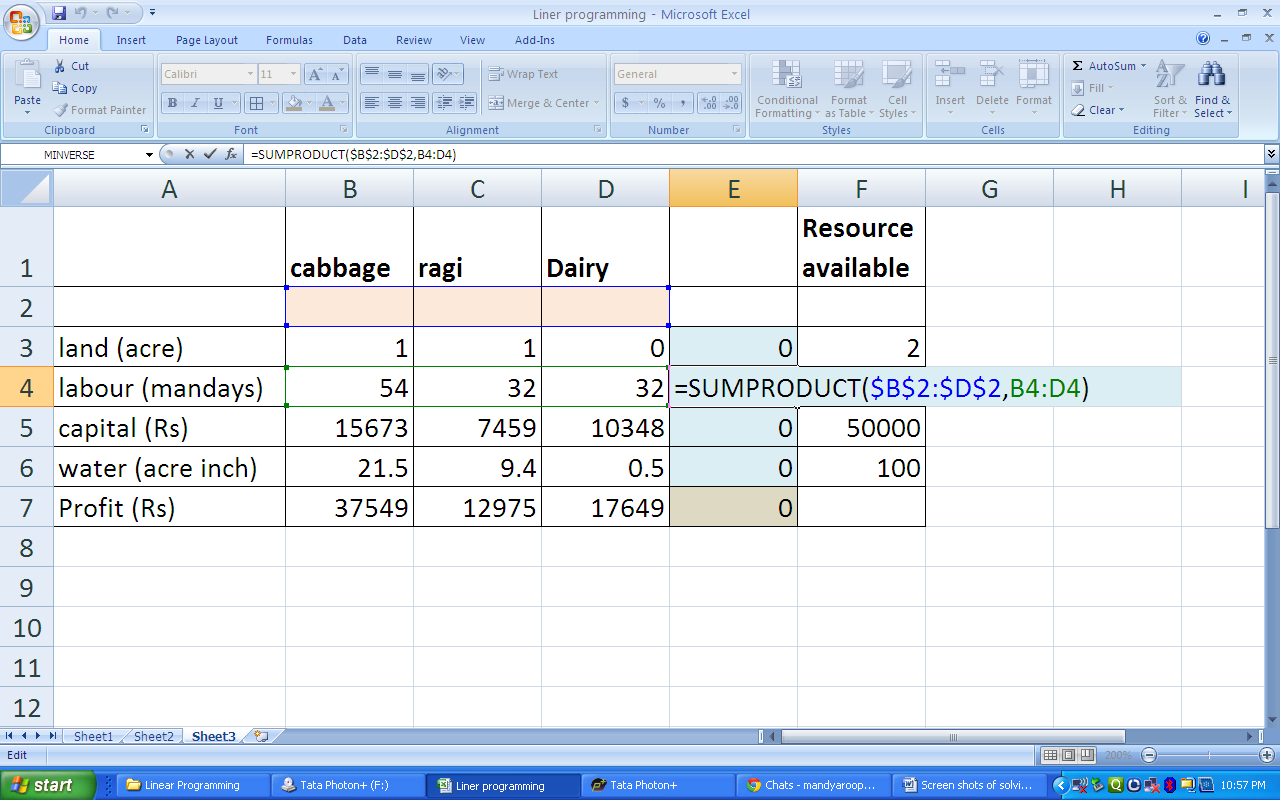


This is how the sheet has to be formatted for programming

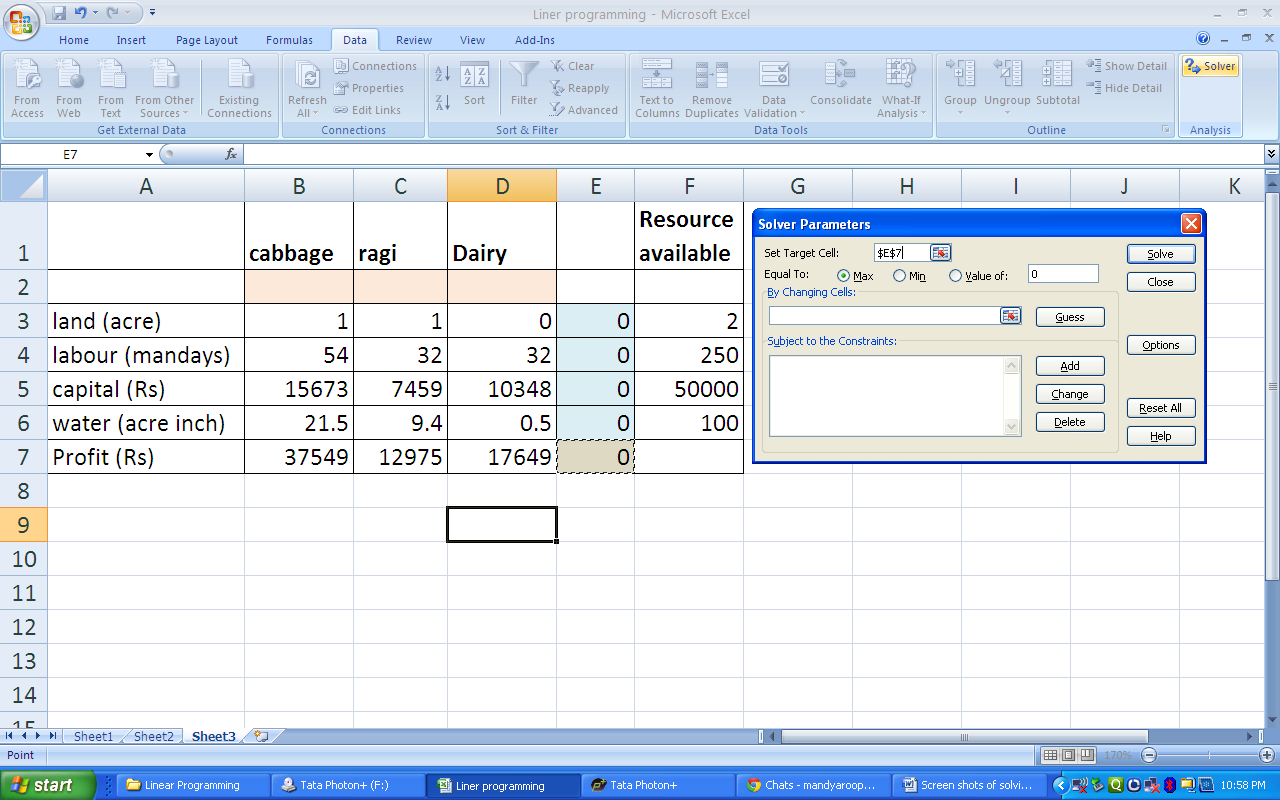
Inserting the formula “ =SUMPRODUCT(………….)”

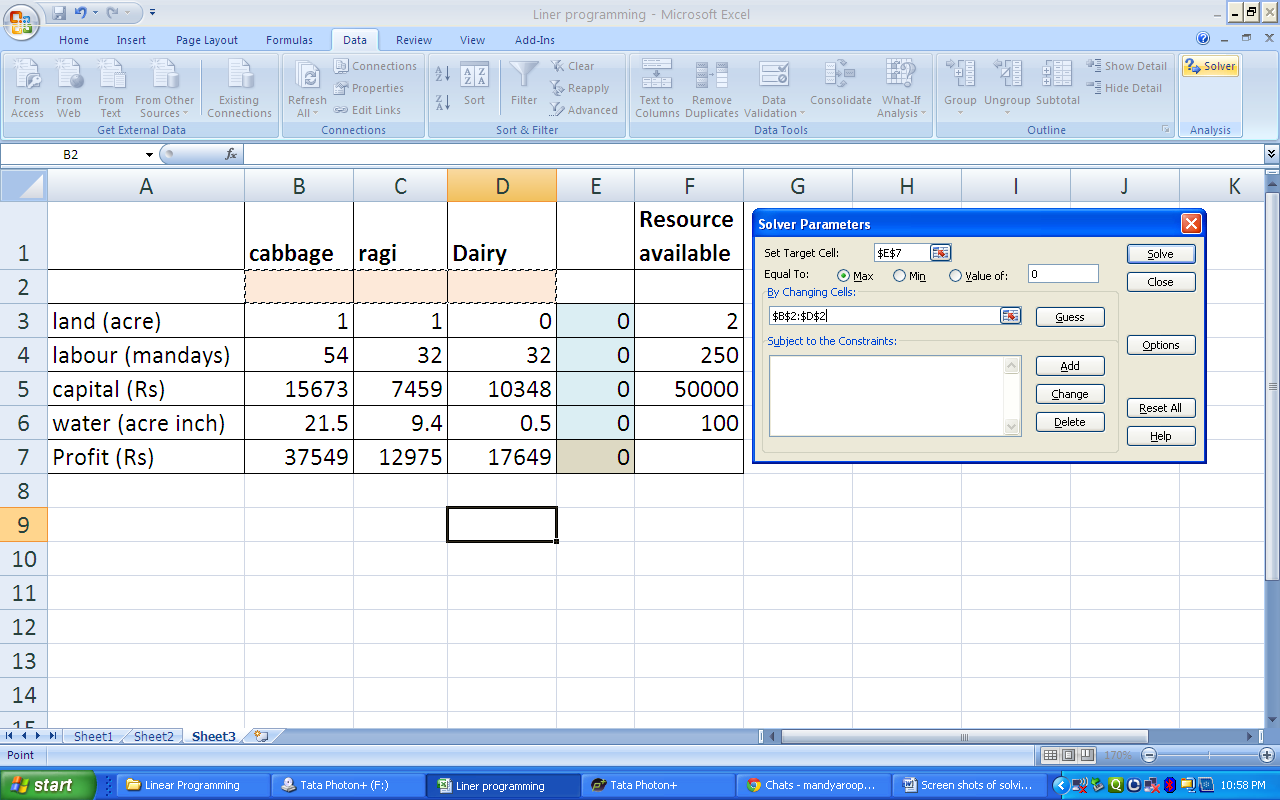


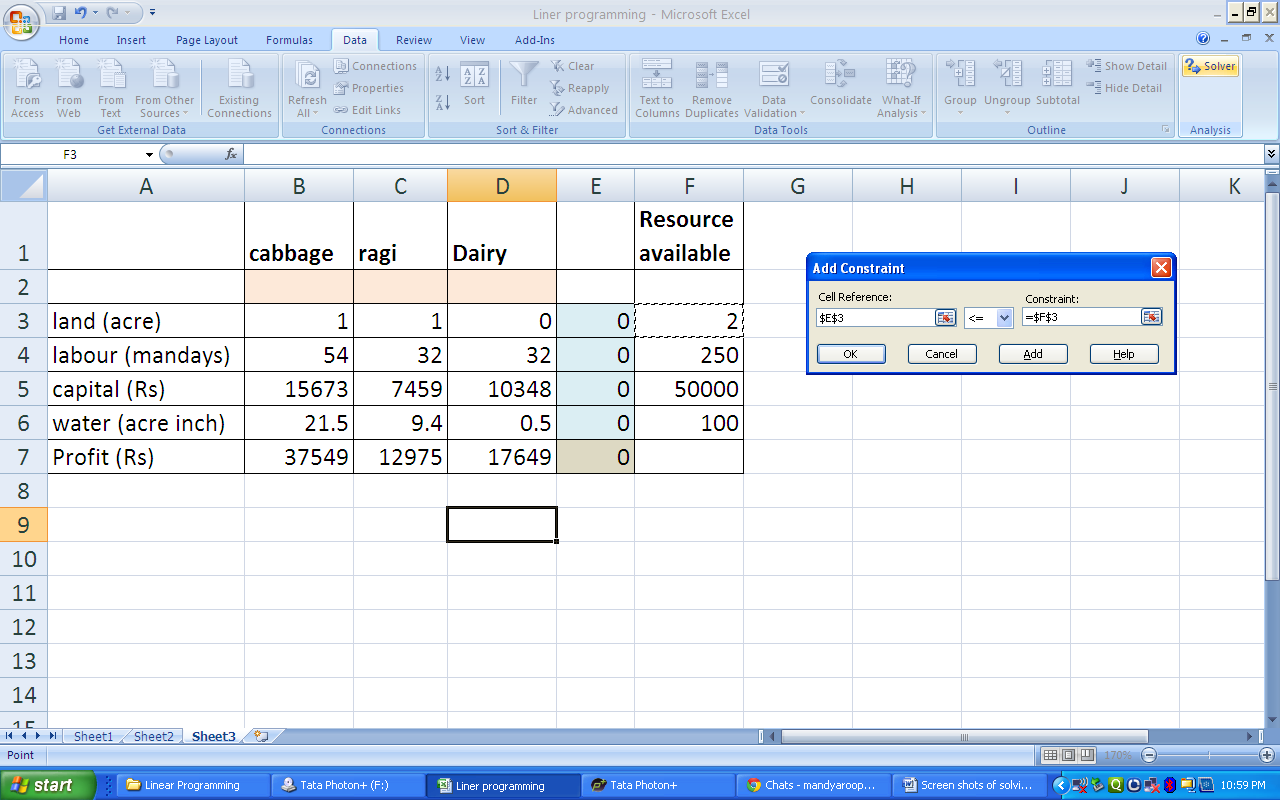
Repeat the same for the resource and profit .



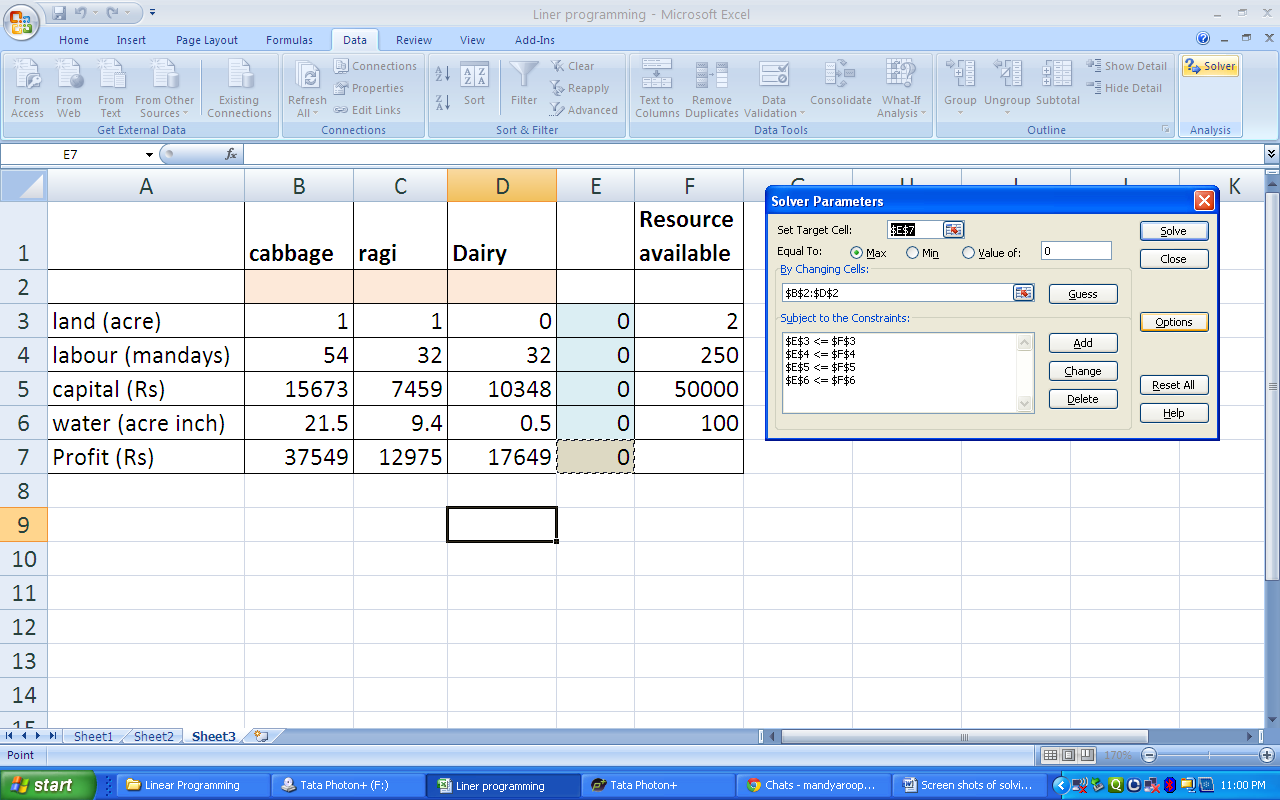
In DATA menu, go for SOLVER tab



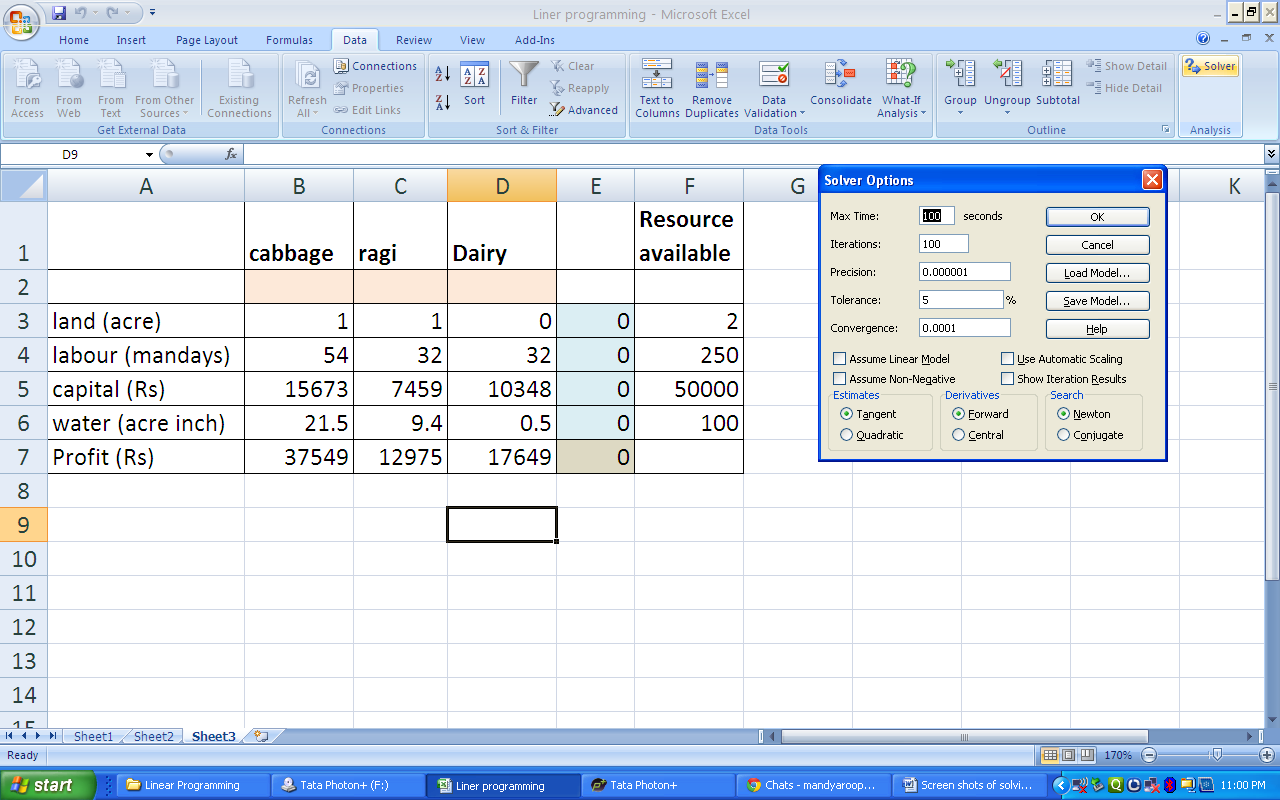
Set the target cell , changing cells and the subjected to constraints as follows 



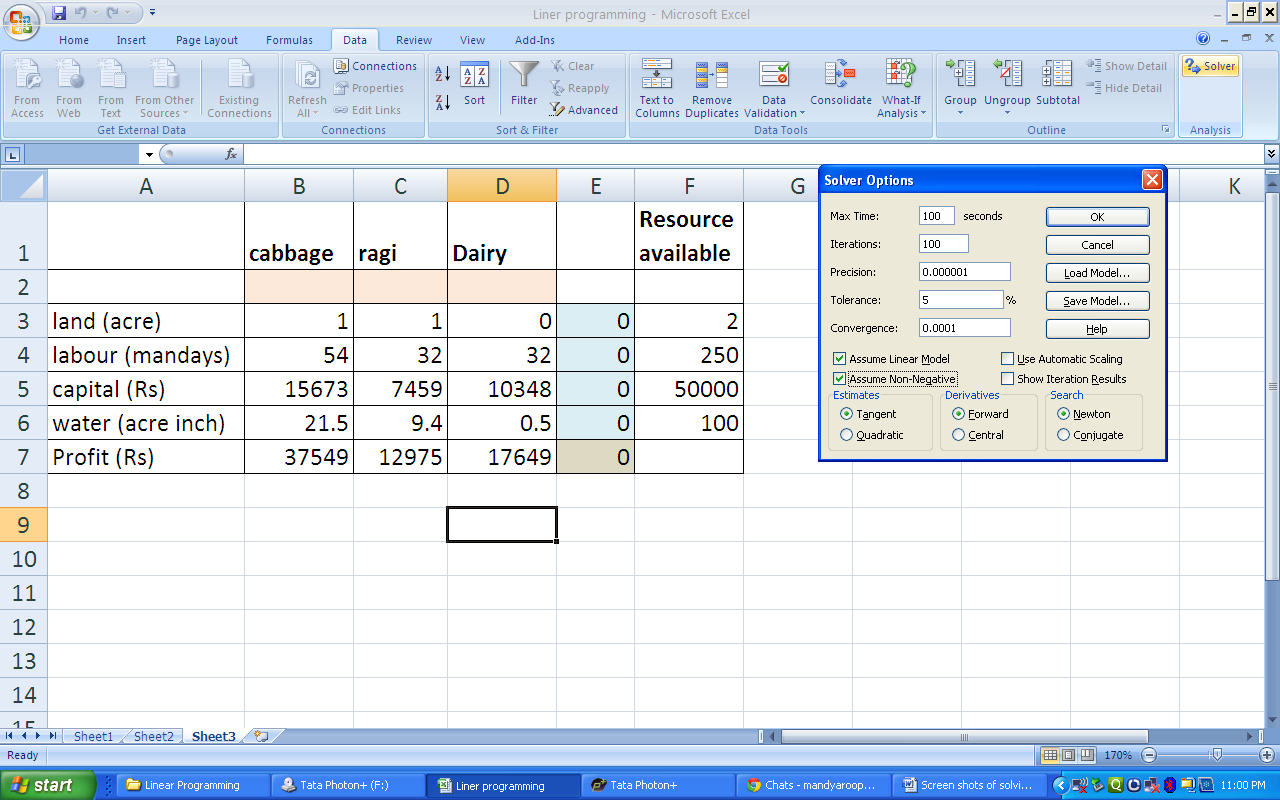
**Be careful about the signs , while assigning the signs in defining the constraint.**



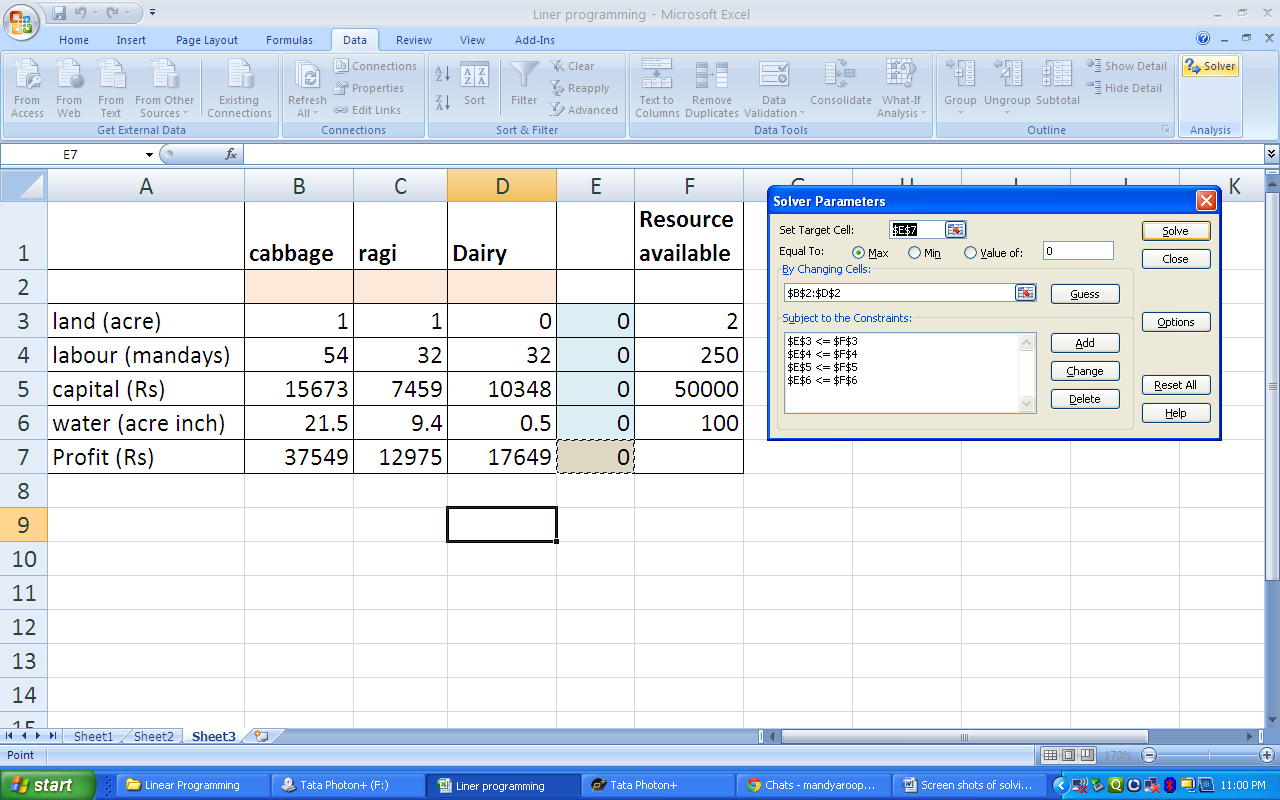
**Click on the OPTION tab**



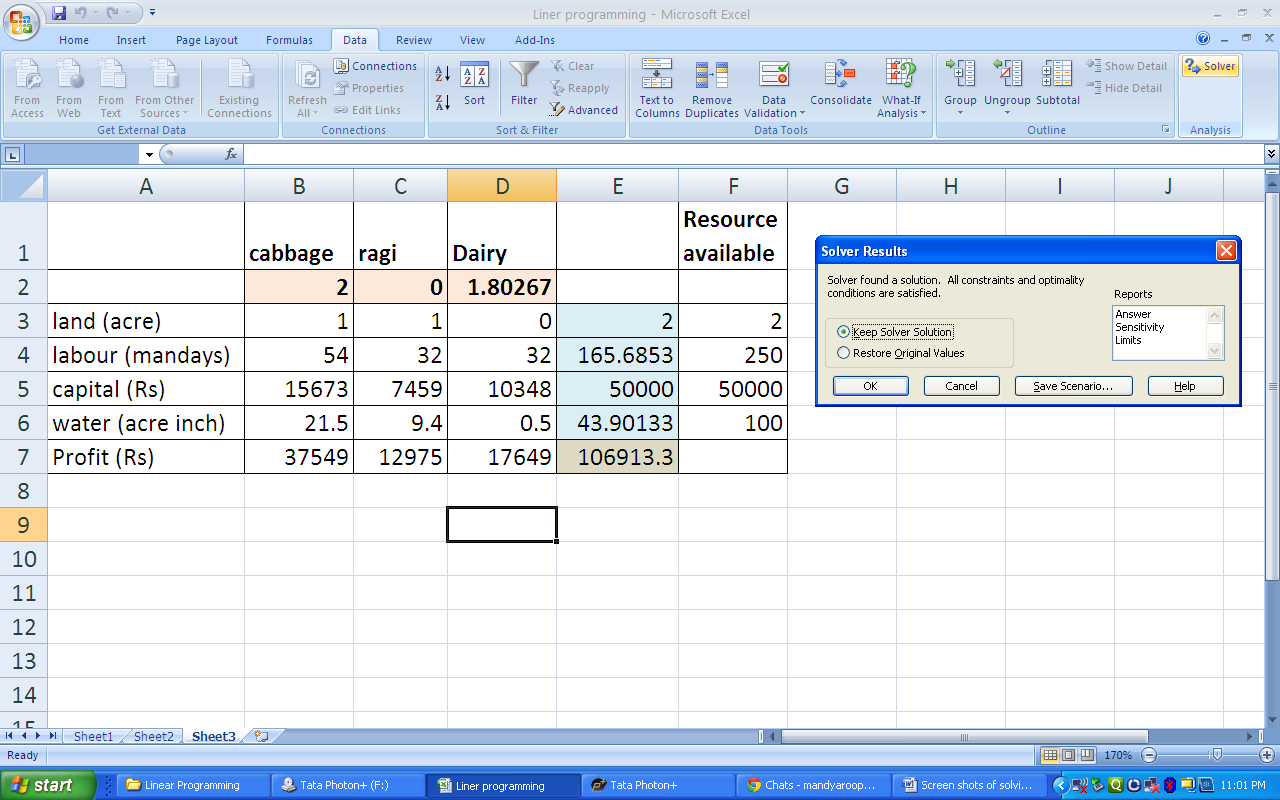
**Check for linear and non negative options**



**Check for linear and non negative options**

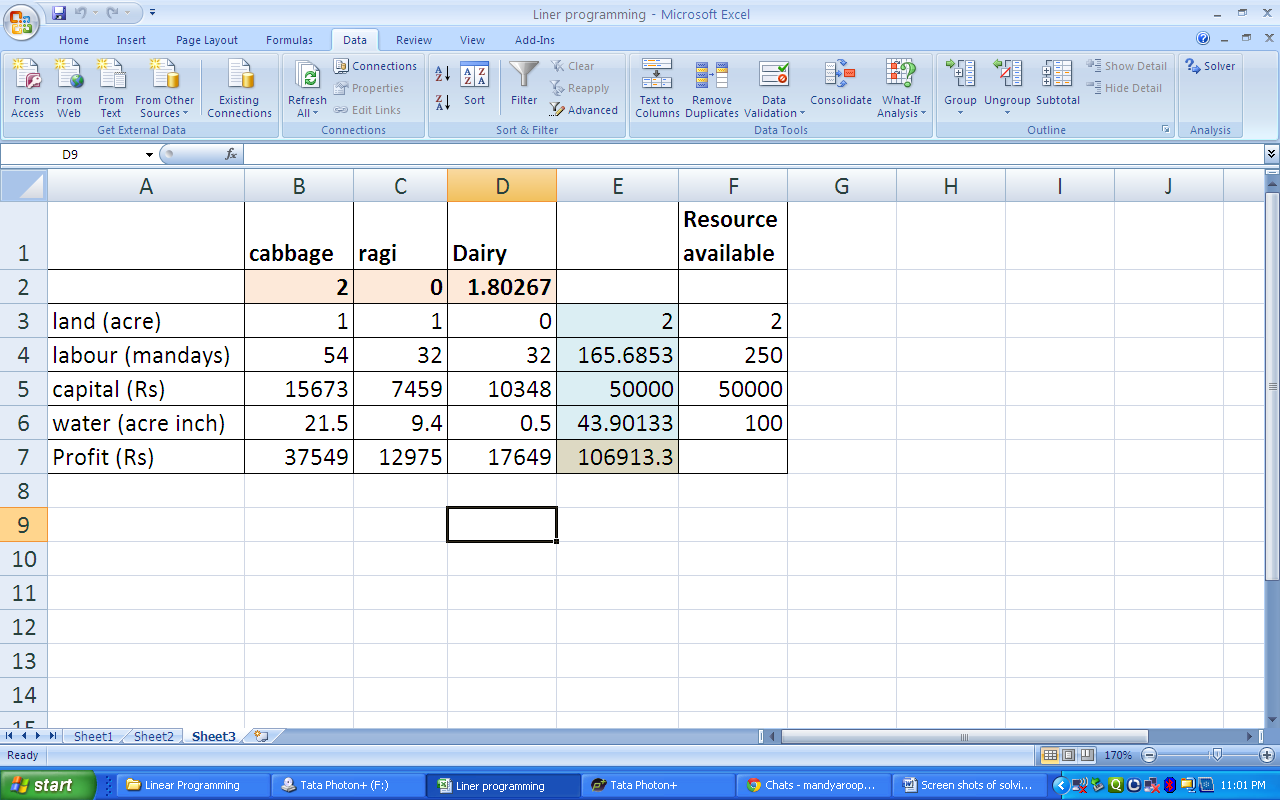


**Result is captured in the cells as follows**

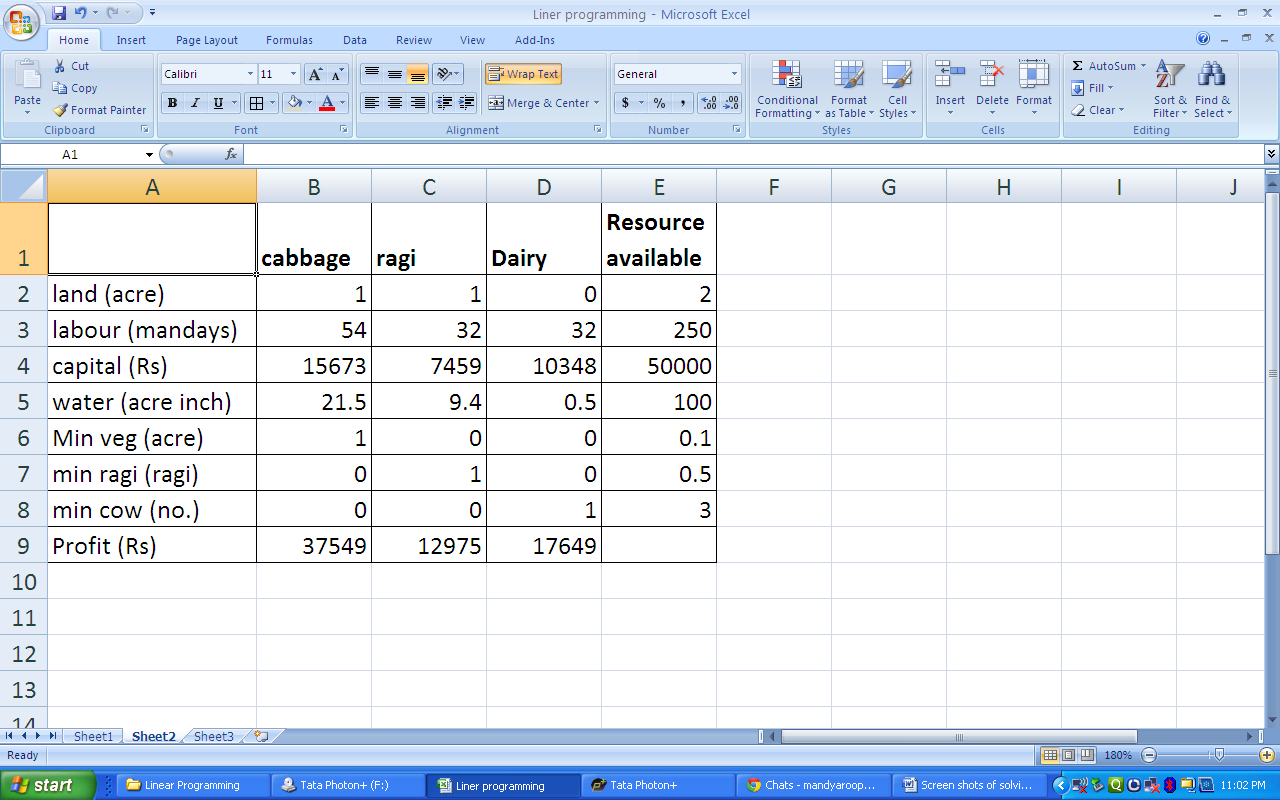


Interpretation:

By using the available resource , farmer can go for 2 acreage of cabbage and maintain 2 milch cows, realizing profit of Rs. 106913. Cultivating Ragi is not economical, however farmer needs it for food which is incorporated as = constraint below.

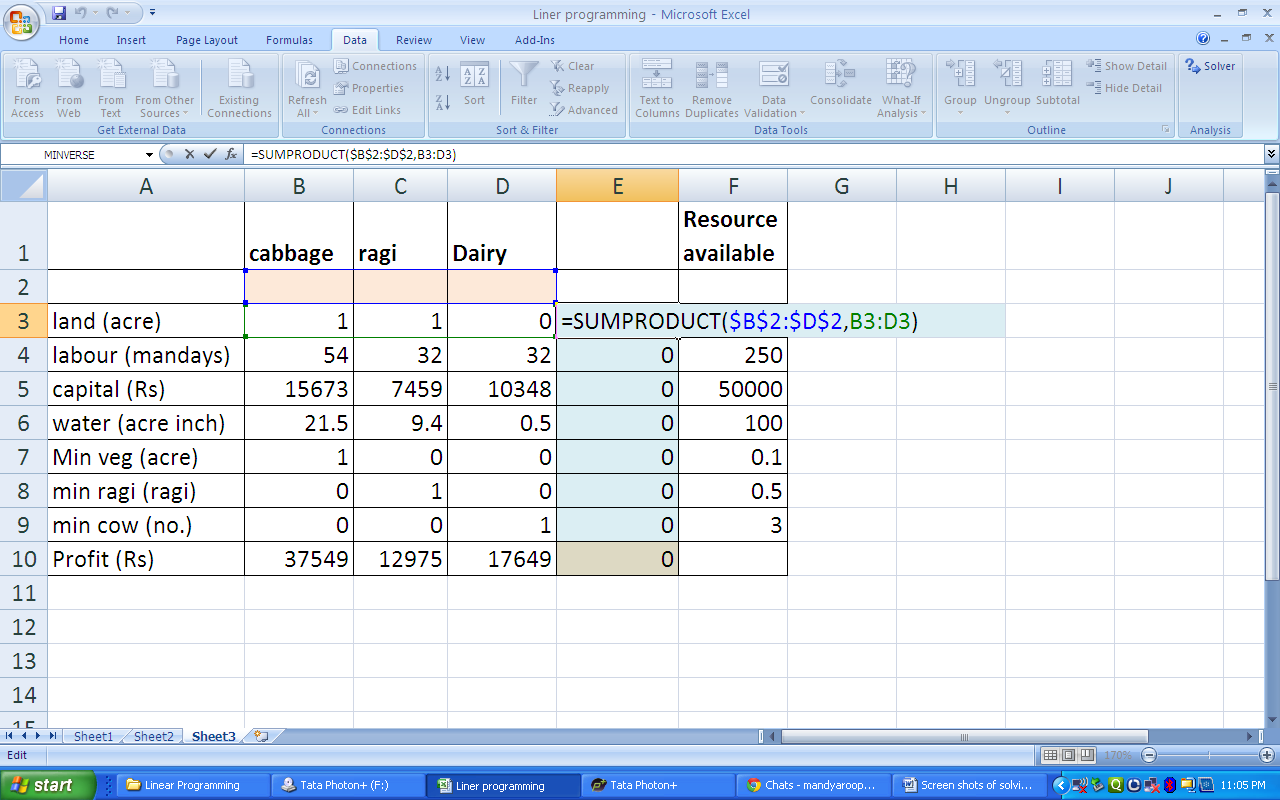


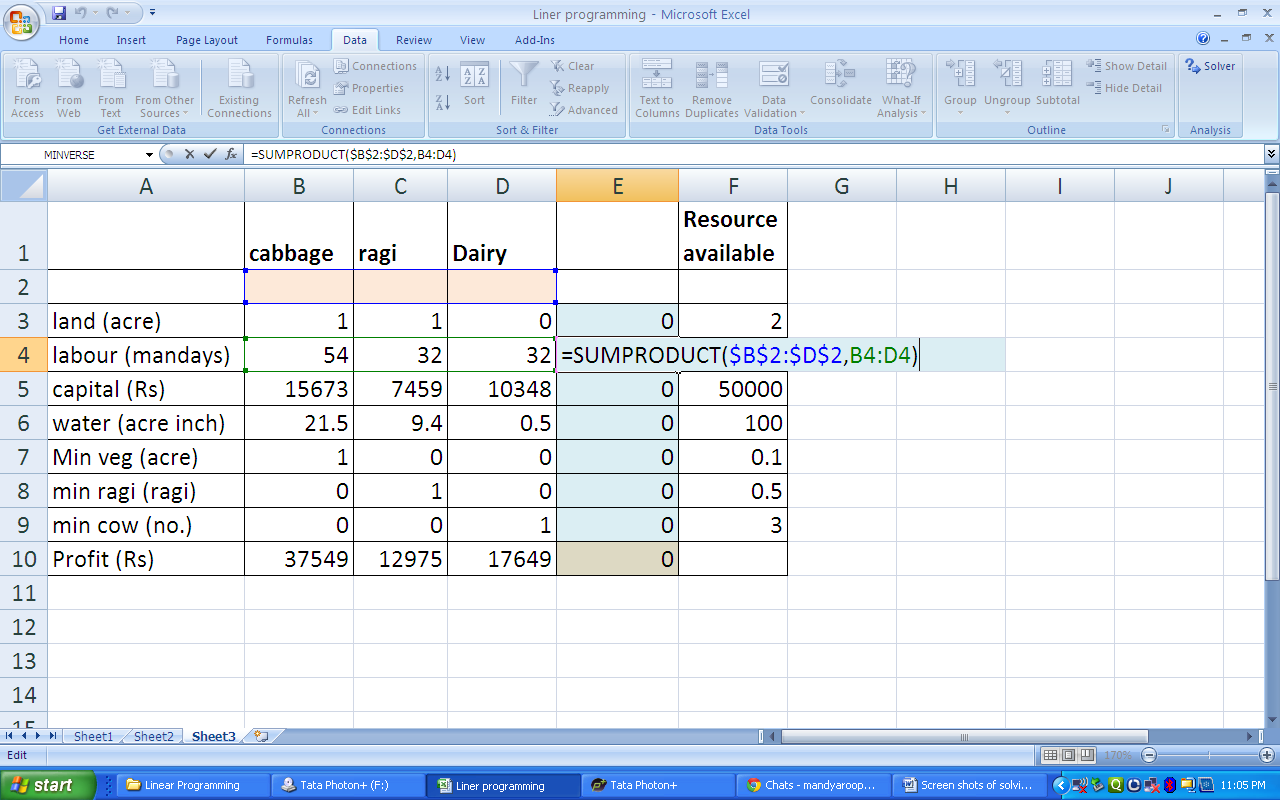
**But in reality some portion of the crop is deviated for home consumption.**

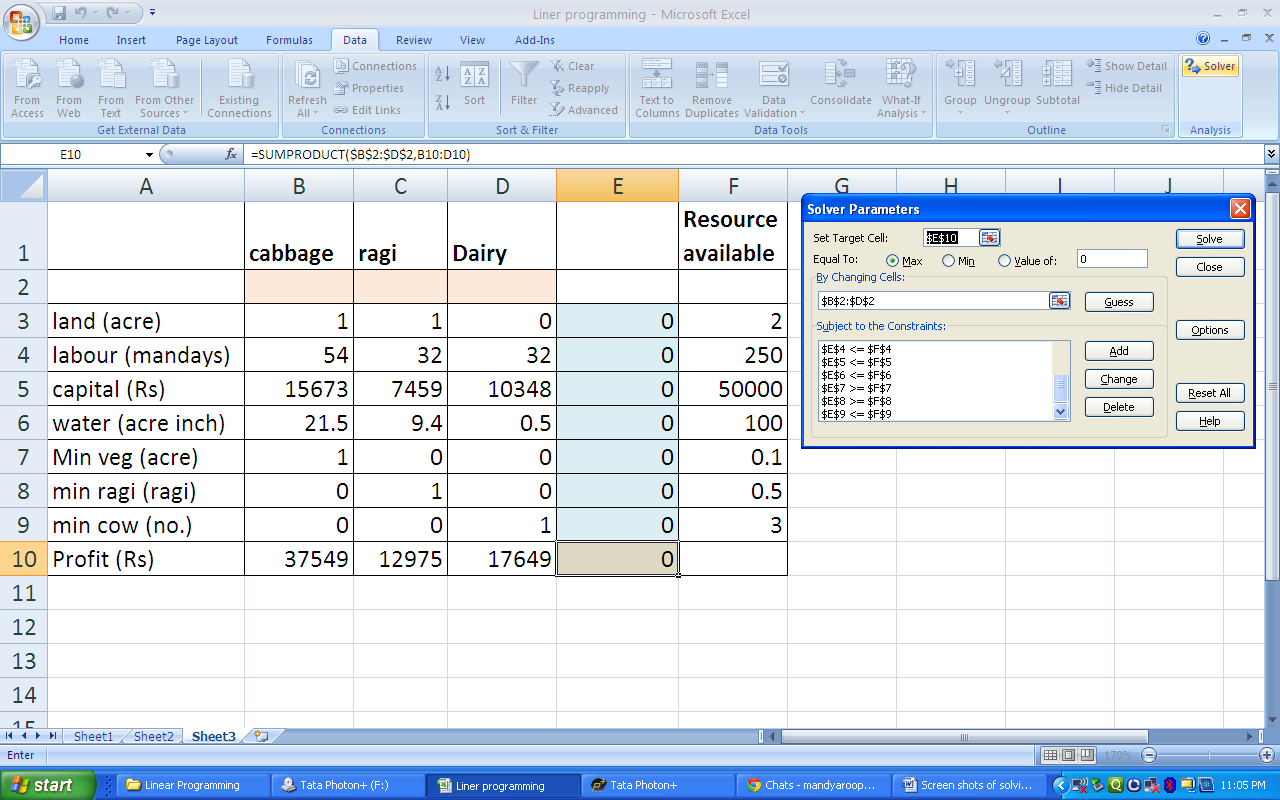


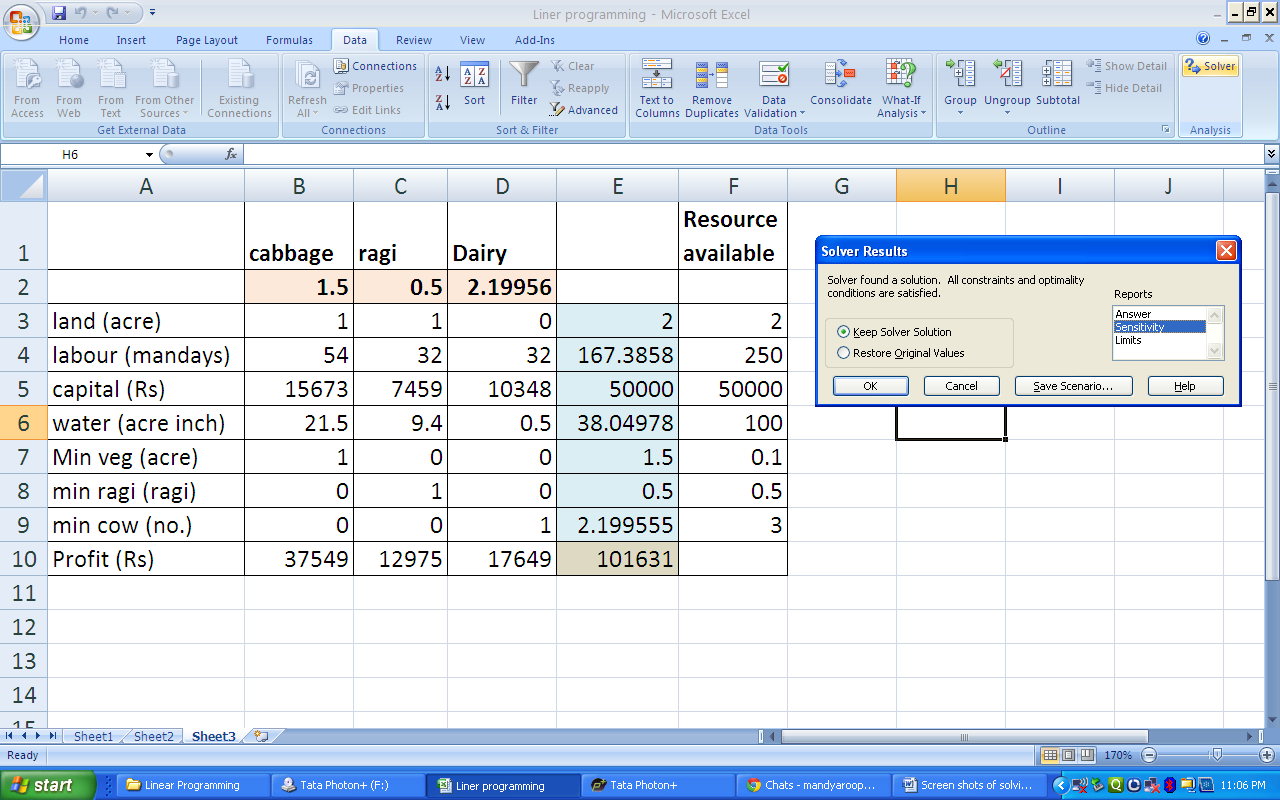
**Proceed according the following screenshots.**

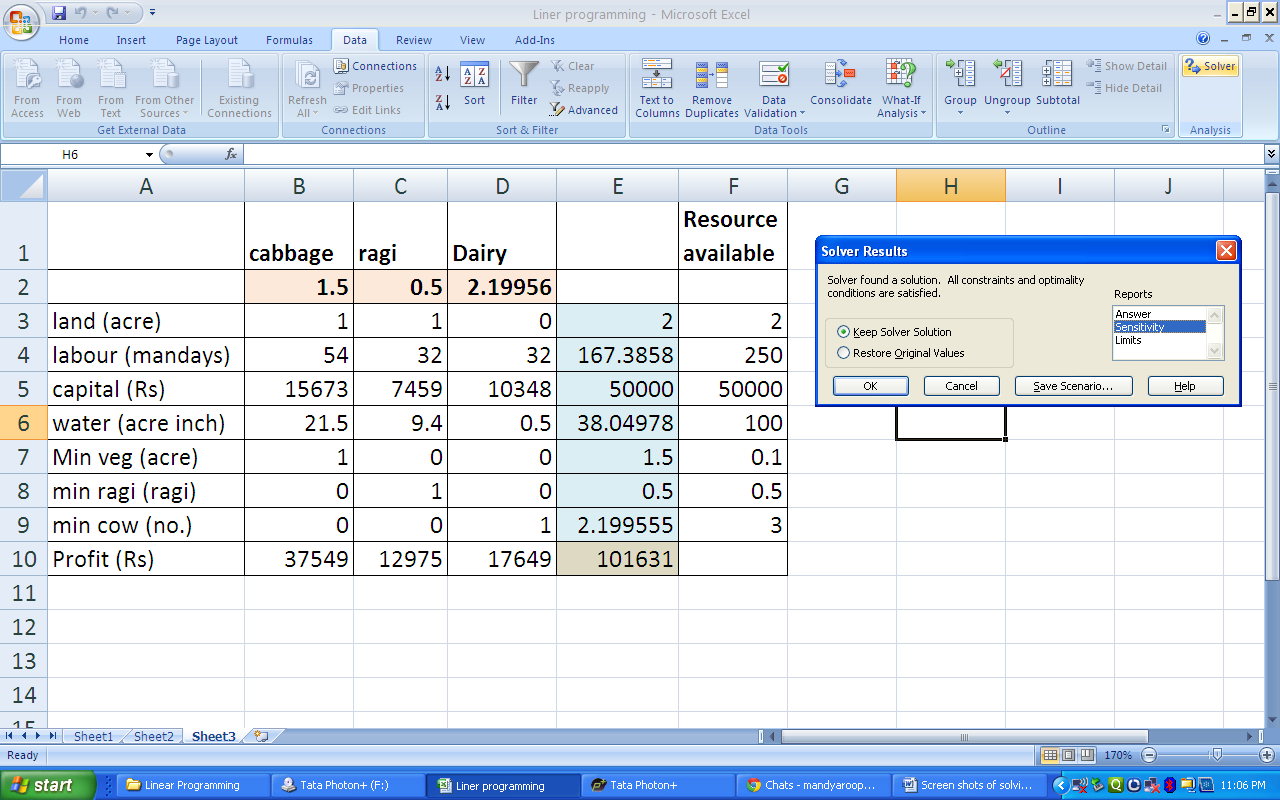
**Be careful regarding the signs in the constraints**.









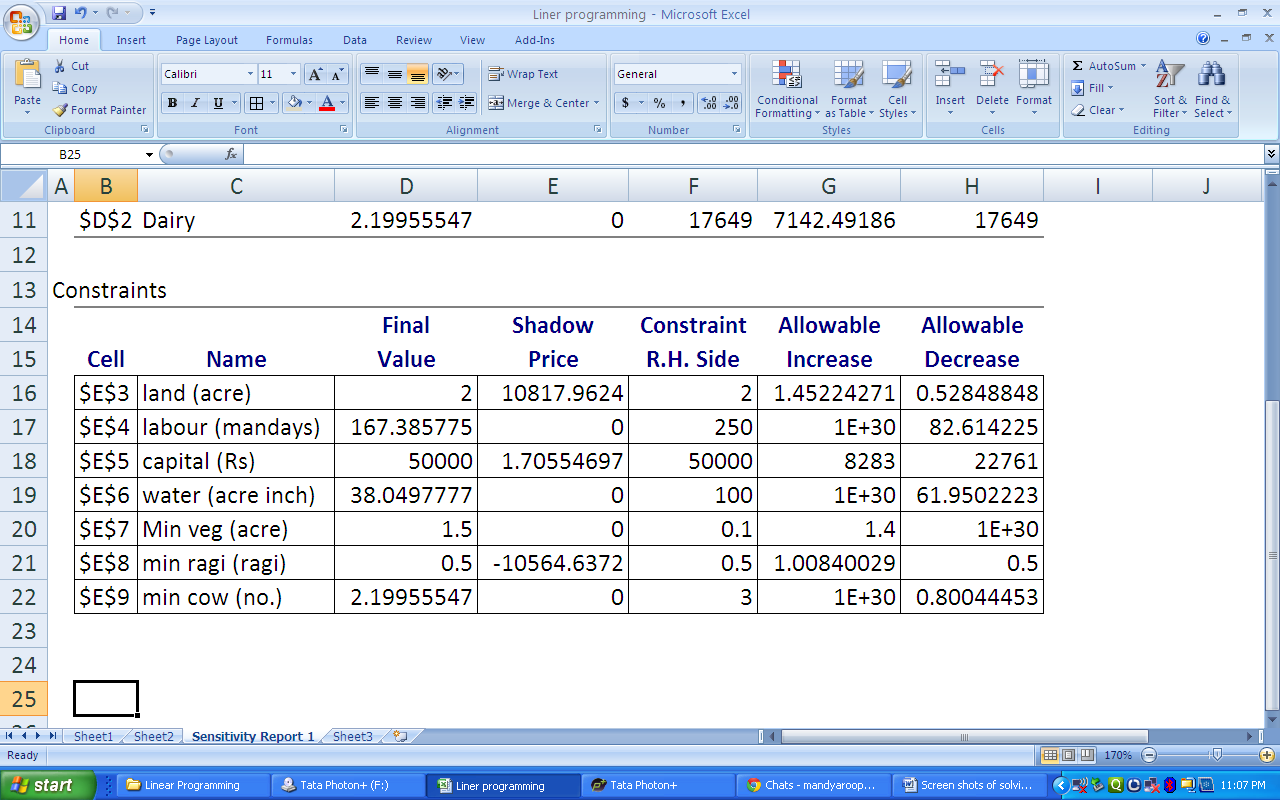


**Interpretation:**

**Farmer can go for 1.5 acreage of cabbage and 0.5 acreage of ragi and maintain 2 milch cows:**

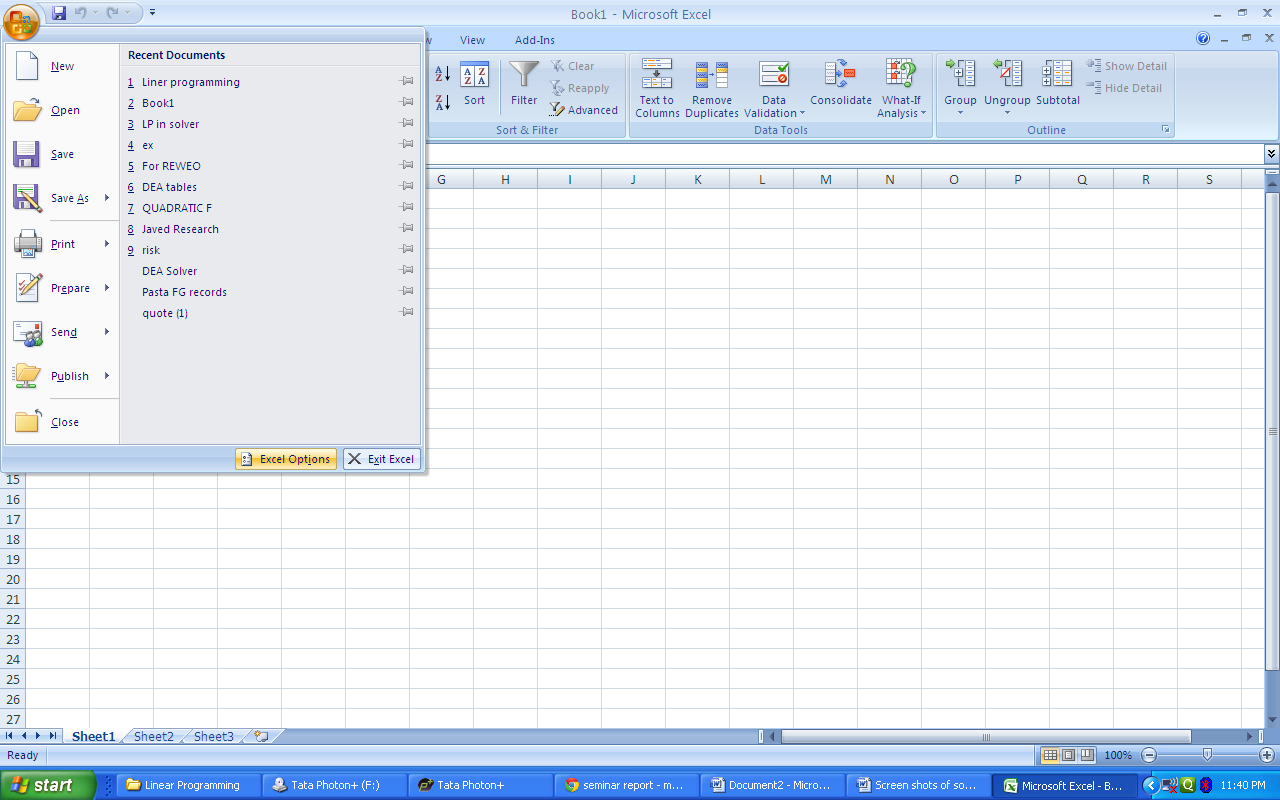
**We do get the sensitivity analysis report.**

**Shadow price indicates the incremental increase in profit for every unit increase in resource.**

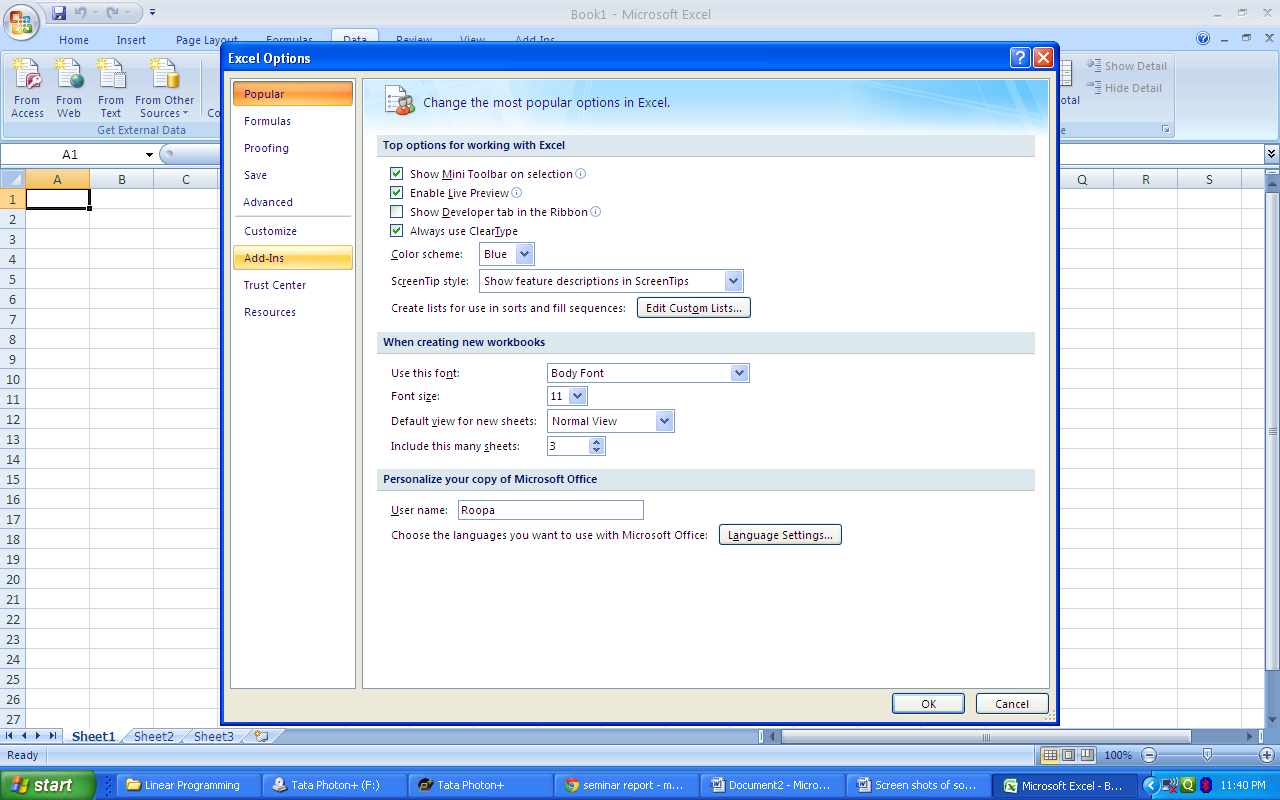


**Procedure to add the package SOLVER to EXCEL**

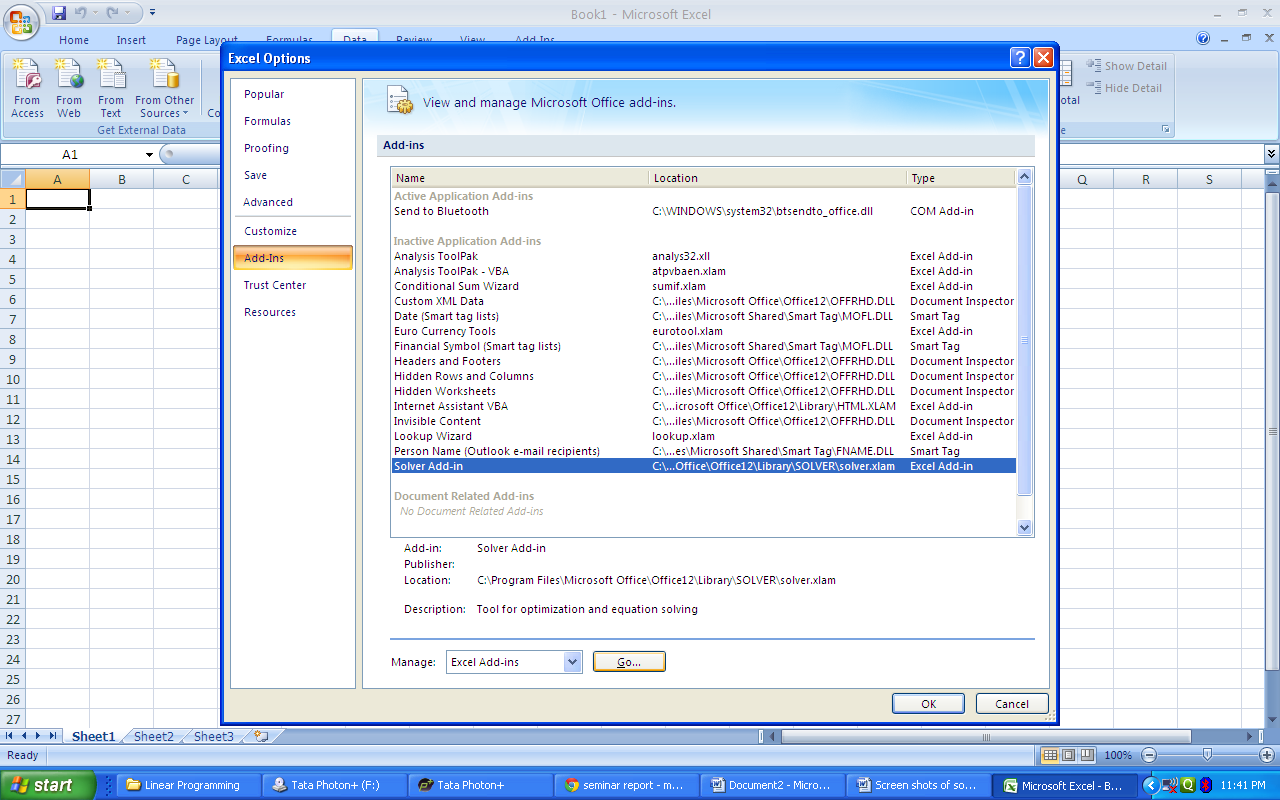
Drop down the MS OFFICE BUTTON. Click on the EXCEL OPTIONS



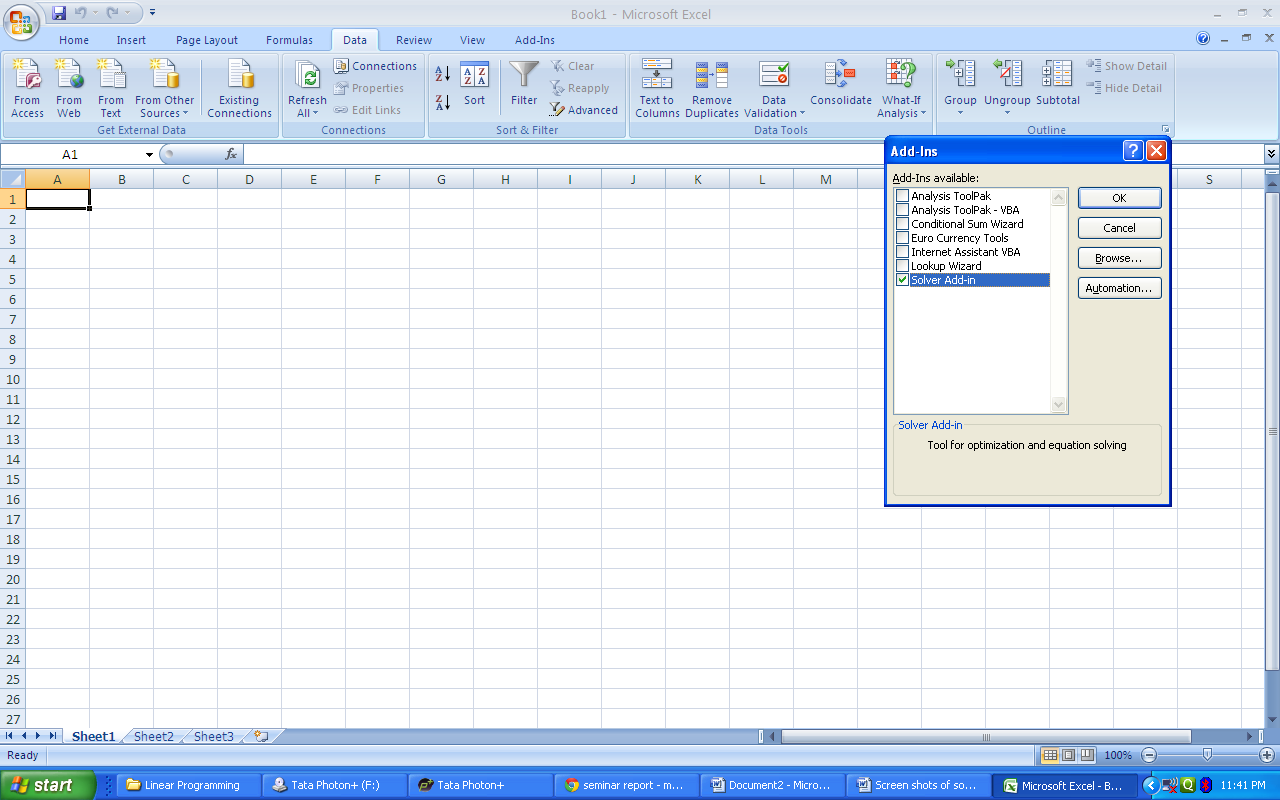
Click on ADD INS



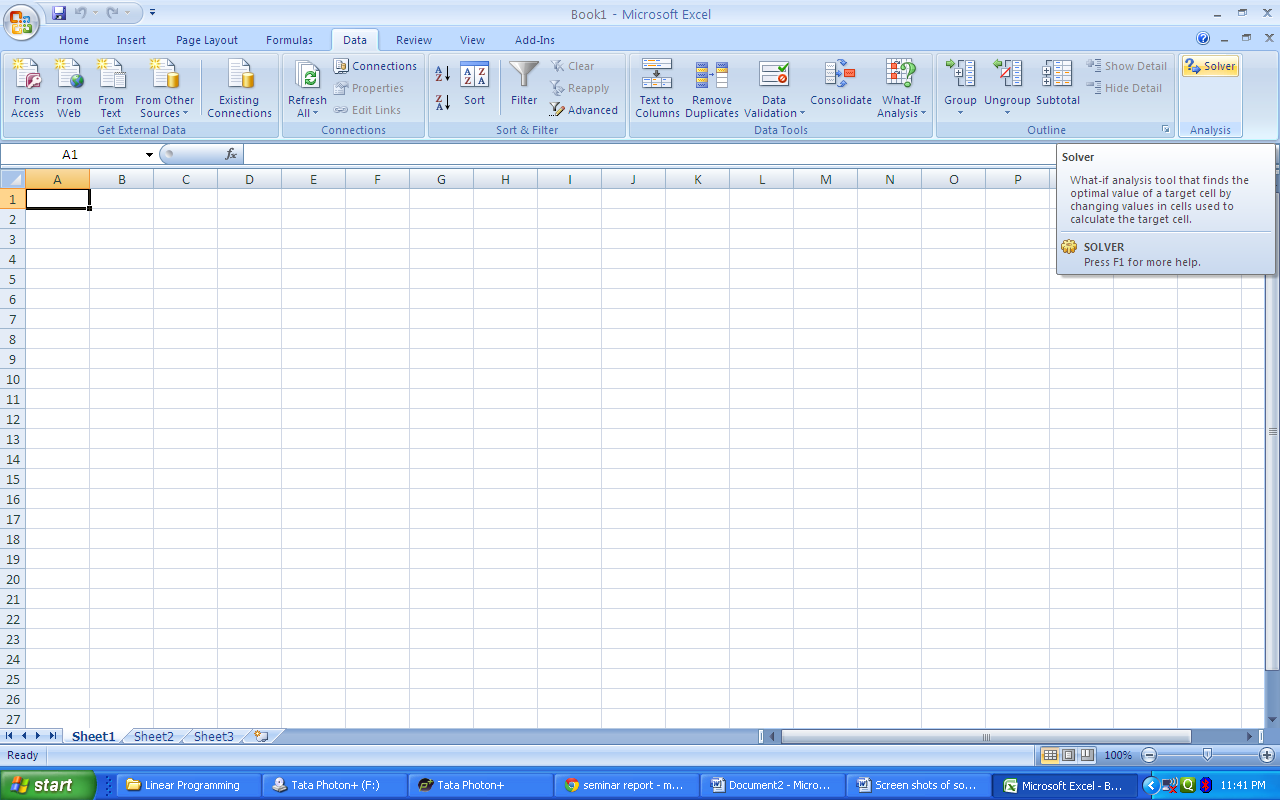
Select Solver add in and click GO



Mark for SOLVER ADD IN.



SOLVER tab appears in DATA menu as under



All the best. You will all turn out to be our best Agricultural Economists.

Smt HS Roopa, Purse Scholar,

Sri Kiran Kumar Patil, Inspire Fellow

PhD Scholars, Dept of Agri Economics, UAS Bangalore