

## Chapter 5 Prepare life table figures

齊心教授

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Adjunct professor, Fujian Agriculture and Forestry University

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1

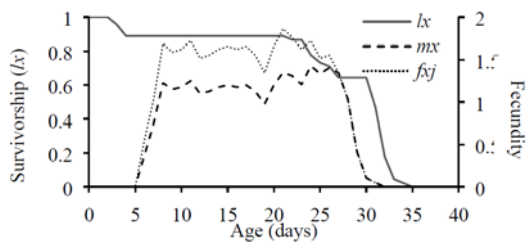
## Science

- Science means precision, beauty, correctness, honesty, etc.
- Scientific figures must be precise, beautiful, correct, and comprehensible. They should be able to represent your data honestly.
- Teachers should be able to guide their students to prepare good figures and to detect possible errors in manuscripts prepared by students.

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3

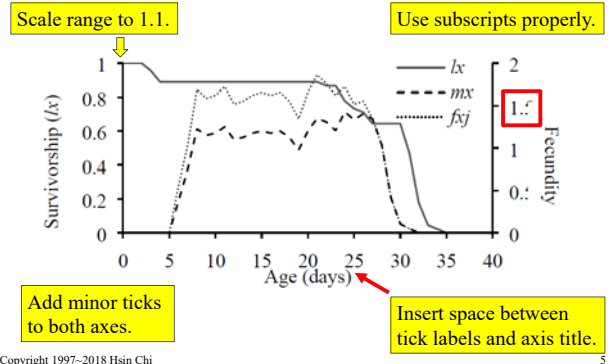
### How to improve this figure?



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### How to improve this figure?



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### Data for figures are ready for you

TWOSEX prepares many data files for your figures:  
 ...\_1\_Fig\_Sxj.txt (the age-stage survival rate  $s_{xj}$ ).  
 ...\_2\_Fig\_FxLxMxLxMx.txt ( $l_x, f_{xj}, m_x, l_x m_x$ , and cumu.  $l_x m_x$ )  
 (cumu.  $l_x m_x$  is the cumulative net maternity).  
 ...\_3\_Fig\_Exj.txt (the age-stage life expectancy  $e_{xj}$ ).  
 ...\_4\_Fig\_Vxj.txt (the age-stage reproductive value  $v_{xj}$ ).  
 ...\_5\_Fig\_SASD.txt (the stable age-stage distribution).  
 ...\_6\_Fig\_Pxj.txt (the distribution of mortality).

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6

**SigmaPlot**  
 generates high quality figures  
 for publication, although  
 SigmaPlot is quite expensive.

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### Change the units to mm

- Click on  $\Sigma$ .
- Click on Options.
- Click on Page.
- Choose Millimeters (mm).

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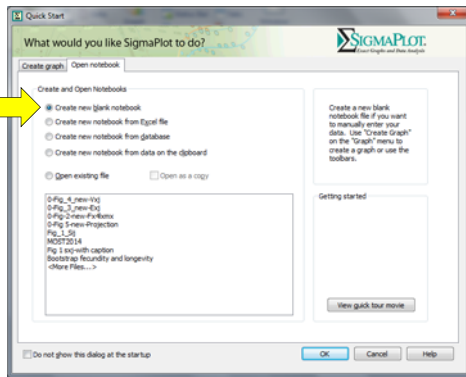
8

### Figure 1: Age-stage survival rate ( $s_{xj}$ )

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9

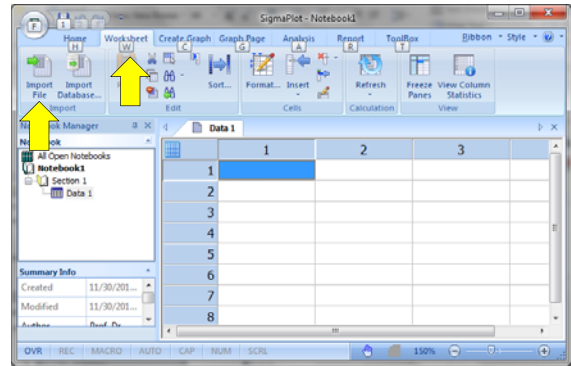
### Select "Create new blank notebook"



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10

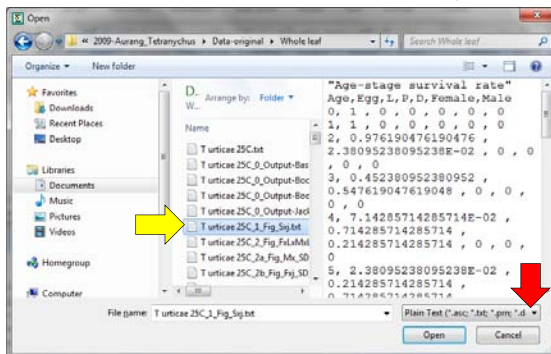
### Worksheet → import file



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11

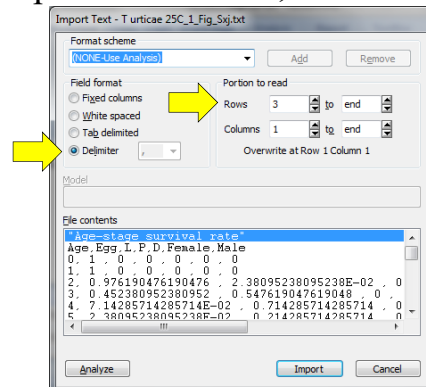
### Select figure data file ( $s_{xj}$ )



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12

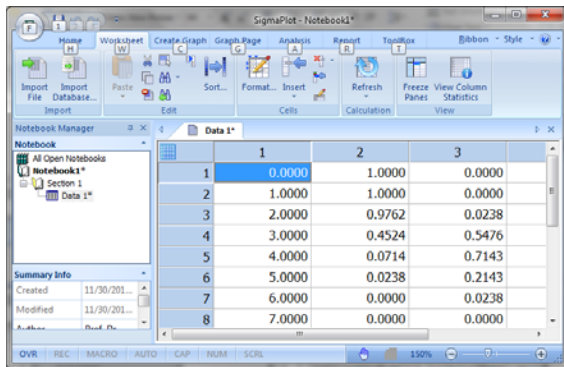
### Import: delimiter “,” and Rows 3



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13

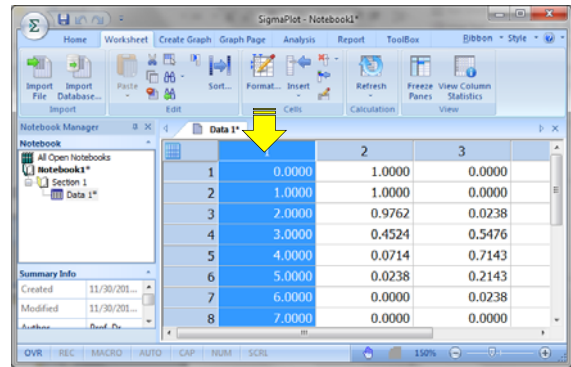
### Imported data



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14

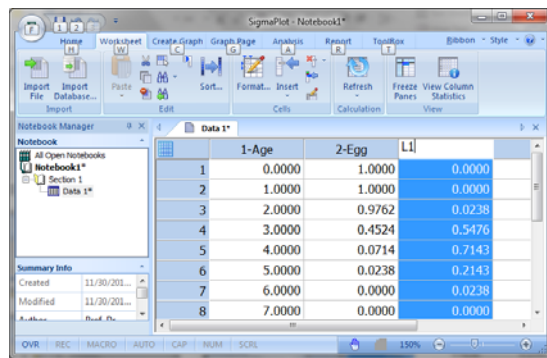
### Add column title



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15

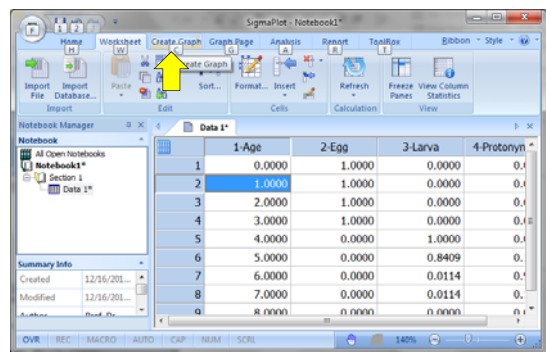
### Add column title



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16

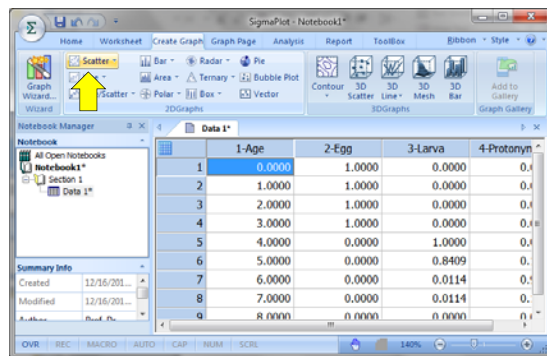
### Create Graph



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17

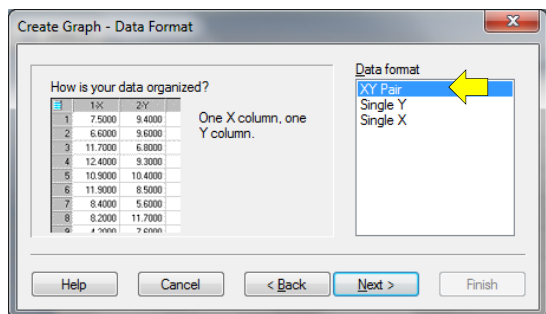
### Scatter Plot



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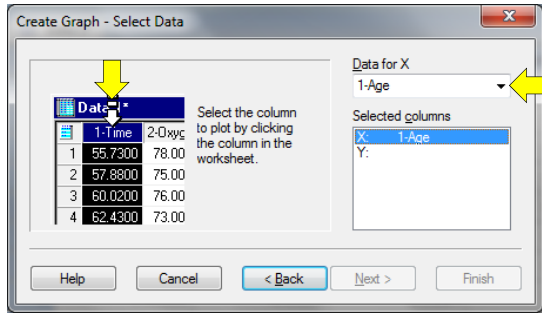
### XY Pair



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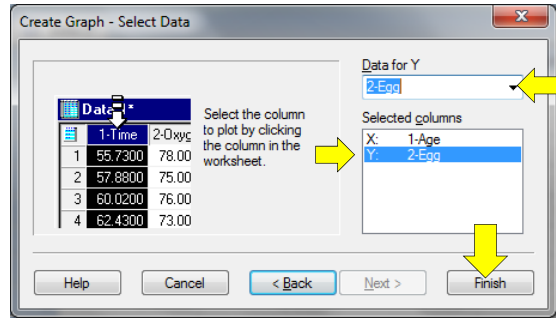
Select column 1 Age for x



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20

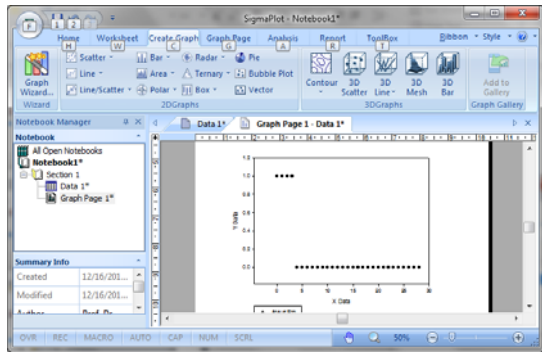
Select column 2-Egg for Y. Click on Finish.



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21

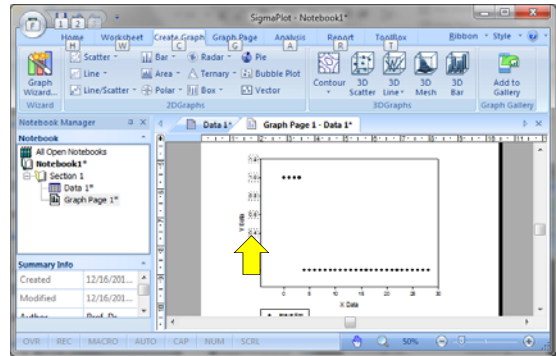
Preliminary view



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22

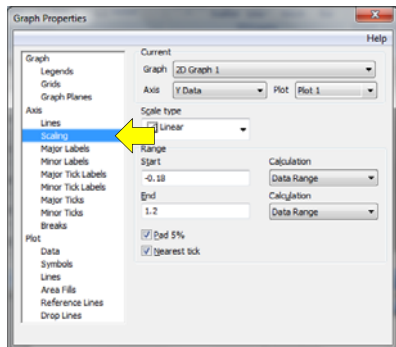
Double click on y-axis



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23

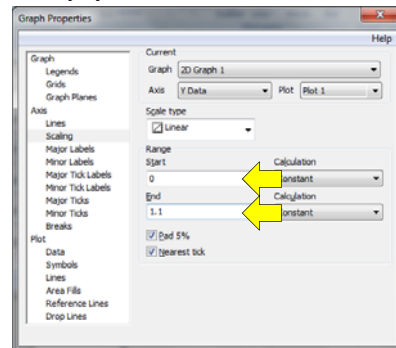
Change Scaling



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24

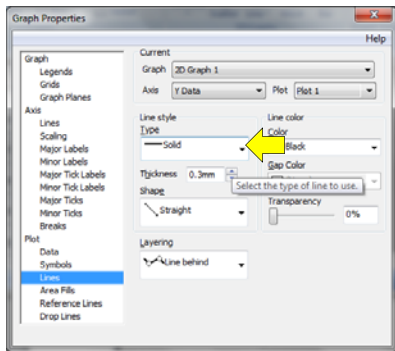
Start = 0, End = 1.1  
(In this way, you will not see survival rate > 1)



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25

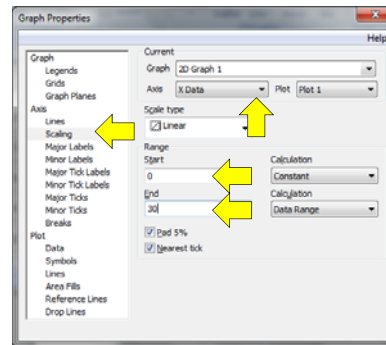
Line type → Solid



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26

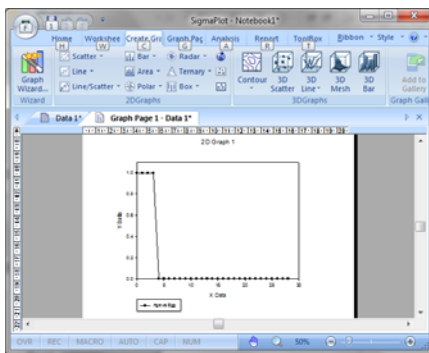
Double click on *x*-axis.  
Change Scaling, Start, and End



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27

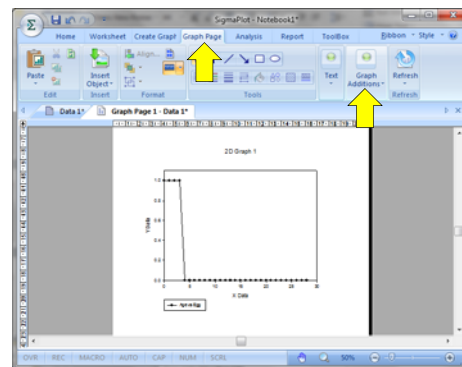
Survival curve of egg stage



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28

Graph Page → Add plot



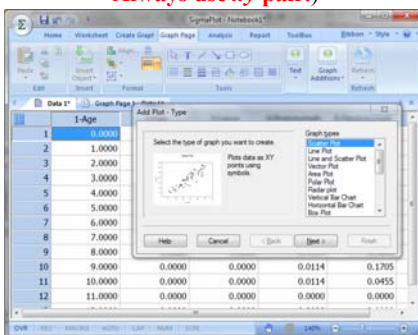
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29

Add plot one by one

(To have control of each line, don't use multiple scatter.

**Always use *xy* pair.**)

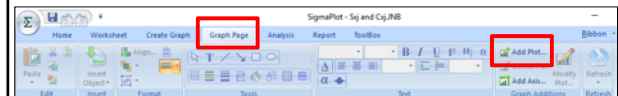


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30

Add each line one by one

- Graph Page—Add Plot—Scatter Plot— Simple Scatter— **XY Pair**



- **Never choose “Single y”.**

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31

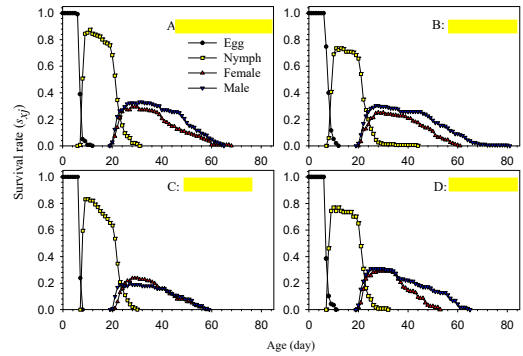
Compare your figure with data file

- Please compare your figure with the data file prepared by TWISEX program. If there is difference, you did something wrong.
- Please make sure that the data  $s_{xy}$  in the figure occurs at the same age  $x$  as in the data file.
- If you prepare the first line by using  $xy$  pair, but the second line by using single  $y$ , you will see the difference.

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32

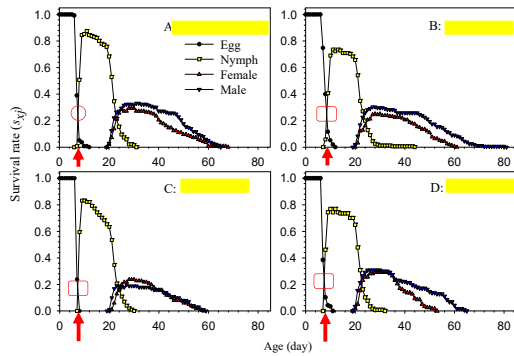
Critical examination



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33

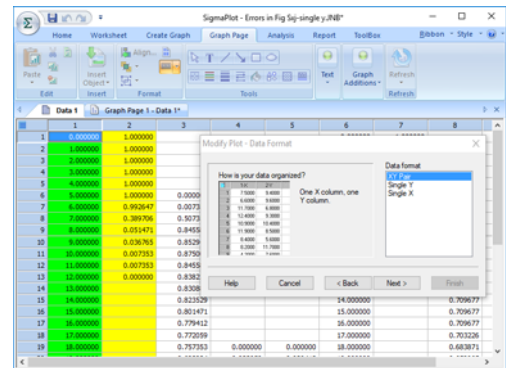
Errors!



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34

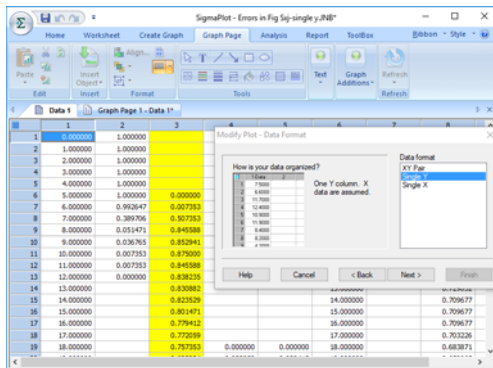
Prepare each line using data format “xy pair”



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35

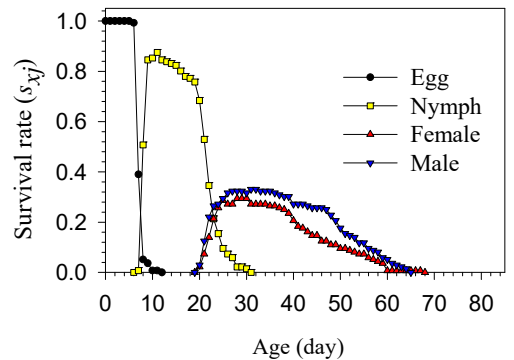
“Single y” data format results in error!



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36

“Single y” data format results in error!



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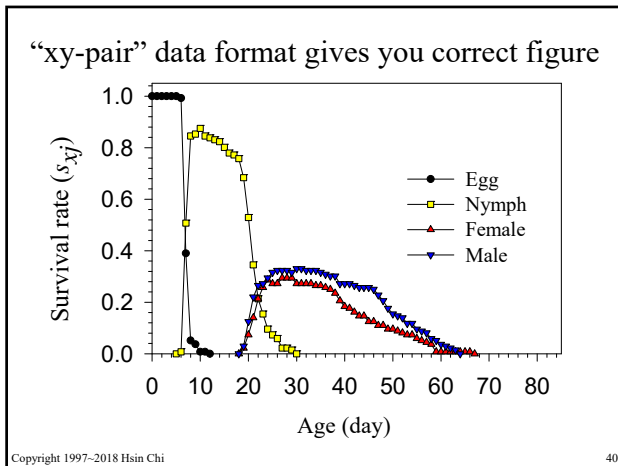
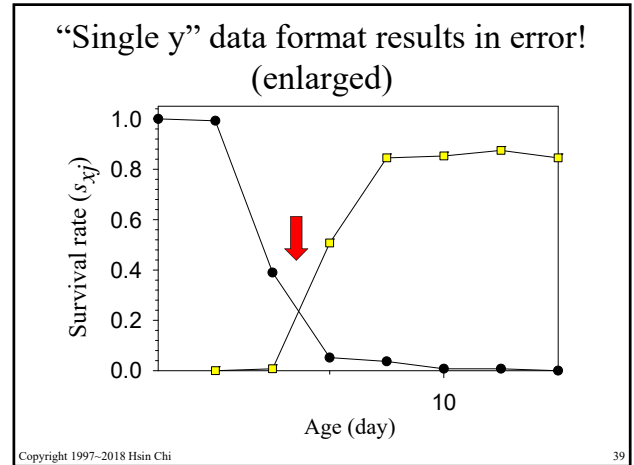
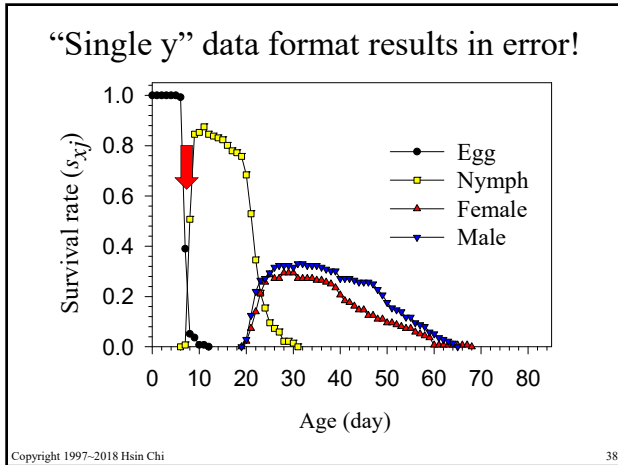
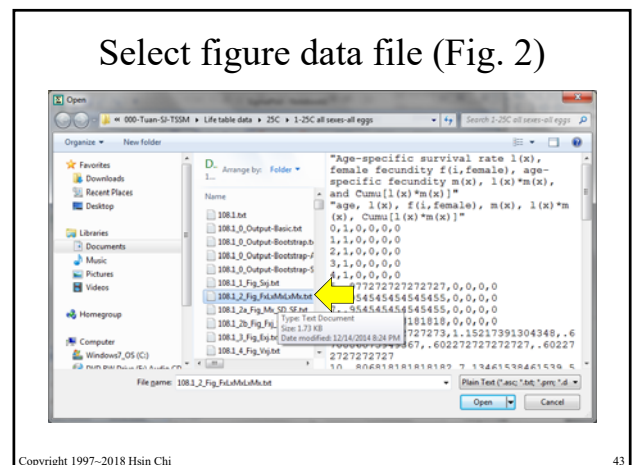
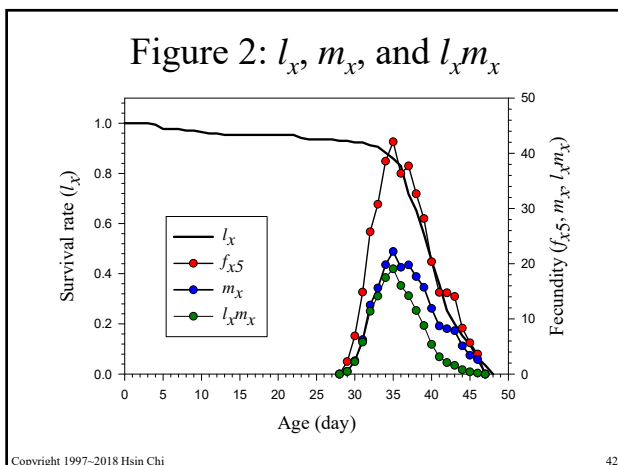
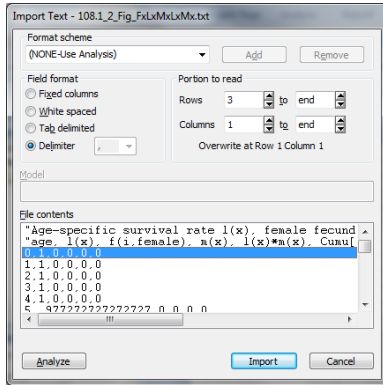


Figure 2  
 $l_x$ ,  $f_{xj}$ ,  $m_x$ ,  $l_x m_x$ , and cumulative  $l_x m_x$   
 (Attention! Plot them in this logical order!)  
 If  $m_x \approx f_{xj}$  (parthenogenetic populations), you don't need to plot both curves.

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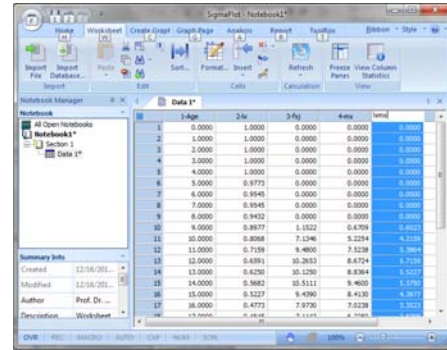
Import: use delimiter “;” and read from Rows 3



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44

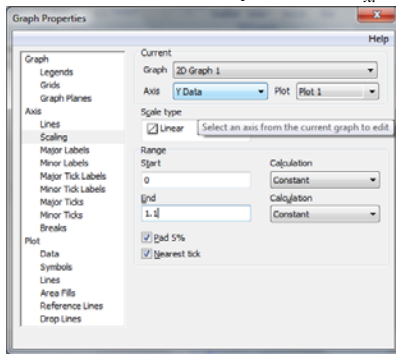
Add column title



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45

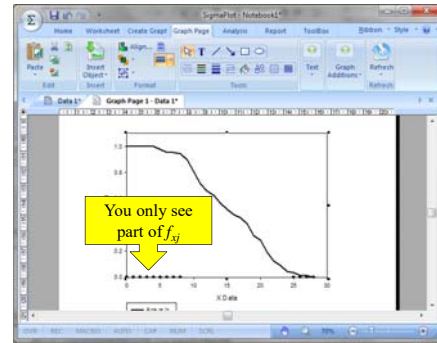
Create Graph: Change Scaling, Start and End.  
You don't need to use a symbol for  $l_x$  curve.



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46

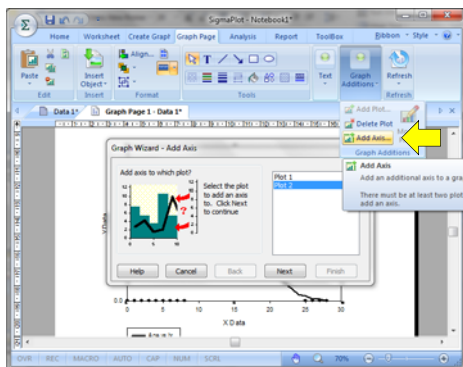
Graph page → Add plot  $f_{xj}$  or  $m_x$ . Because  $l_x < 1$  and  $f_{xj} > 1$ , you need to use right y-axis for  $f_{xj}$  and  $m_x$ .



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47

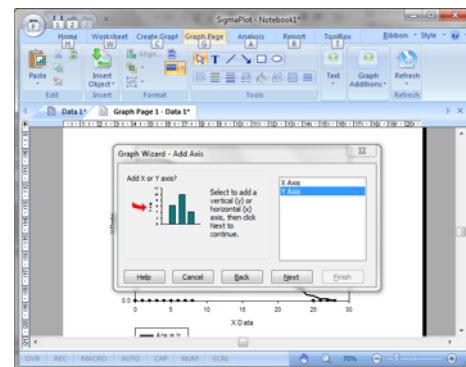
Graph Page → Add Axis for Plot 2



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48

Add y-axis

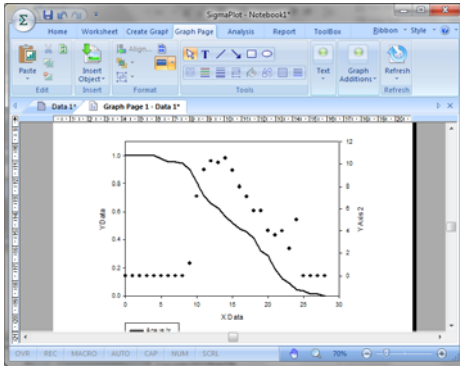


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49



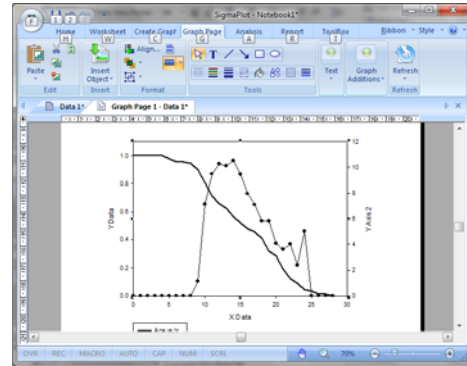
You will now see the complete curve



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50

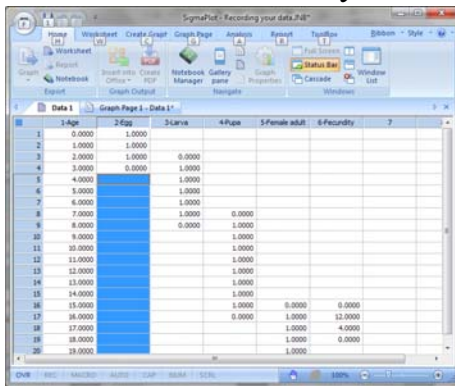
Change scaling and use a solid line



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Delete all unnecessary zeros



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Change major tick (2 mm)  
 Add minor tick (1 mm)  
 Use italic font for  $s_{xj}$ ,  $f_{xj}$ ,  $l_x$ ,  $m_x$ .  
 Use Arial font for number.  
 Use Times New Roman for title.

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53

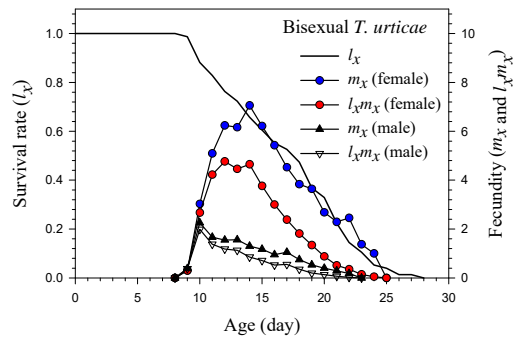
### Font and Size

- Use Times New Roman (font size 14 or larger) for  $x$  and  $y$ -axes title (Age, Survival rate, Fecundity, etc.) unless the journal asks for specific fonts.
- Use Arial (font size 12 or larger) for major tick labels. Numbers in Arial font are more legible.
- For major ticks, use a tick length of 2 mm. For minor ticks, use 1 mm.

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54

Figure 2:  $l_x$ ,  $m_x$ , and  $l_x m_x$  (female and male)



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55

### Equation and

- To insert a high quality **equation**: click Graph Page, select Insert Object – New Object – Microsoft equation 3.0
- You can also paste image files (special arrows, pictures, etc.) to the graph page. In this way, you can export all objects to an image file without losing any part of the figure.

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56

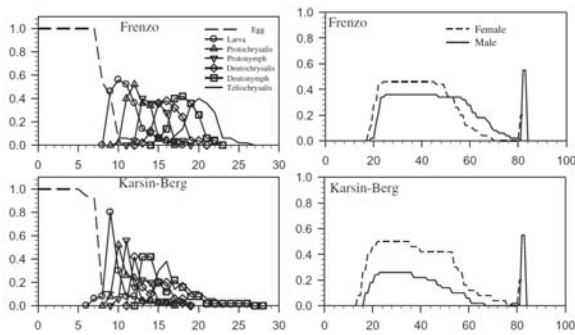
### How to prepare figures for different treatments

- Once you prepare a good figure, you can use it for similar figures of different treatments.
- To avoid mistakes, you should delete the data in SigmaPlot first (don't delete the column heads, if they are the same), then import the data of new treatment. **Make sure no data from the last figure are left there.**
- Then you need only to delete the unnecessary zeros and change the codes of treatments.
- Save the new figure with a new file name.

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57

### Errors (International Journal of Acarology) DOI: 10.1080/01647954.2018.1497086



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58

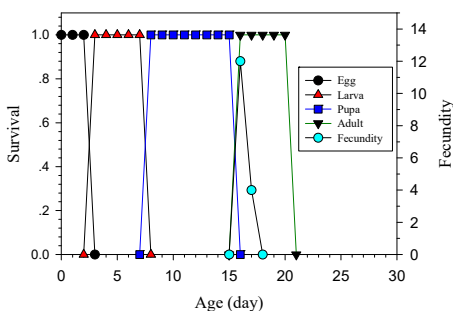
### Multiple figures

- Use Object Properties → Size and Position to align figures.
- Change font size as necessary after all figures are arranged on the same page.
- Use filled symbols and non-filled symbols alternatively to get a better visual effect.
- **You don't need to prepare all figures from the start. You can replace the data to get new figures. But, be careful!**

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59

### If your computer shows 0.6 as .6



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60

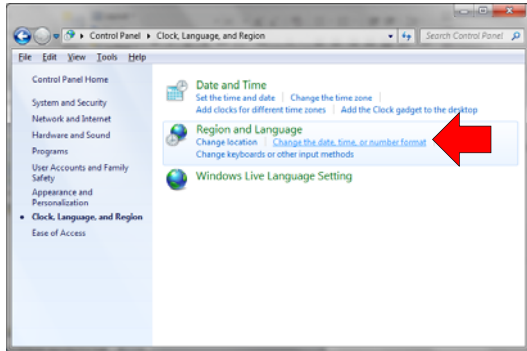
### Control panel → Clock, language, and region



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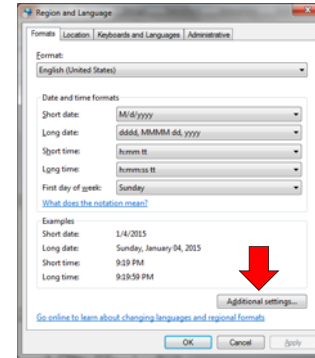
61

Change the date, time, or number format



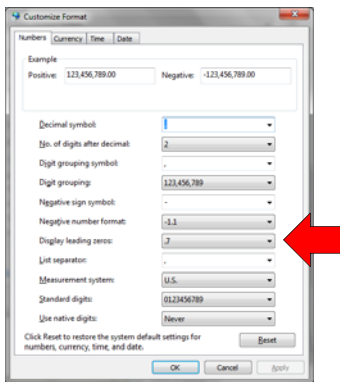
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Additional settings



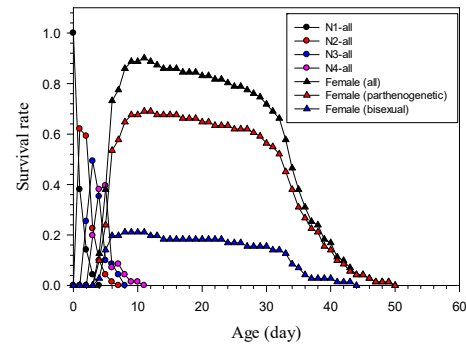
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Display leading zeros (0.7), decimal symbol: “.”



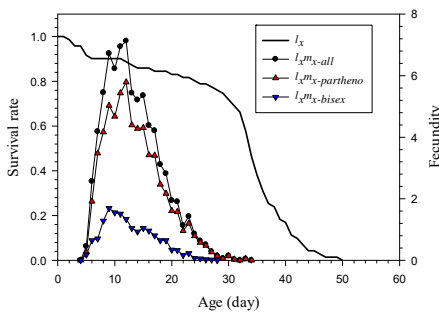
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$s_{xj}$  curves of different reproductive types



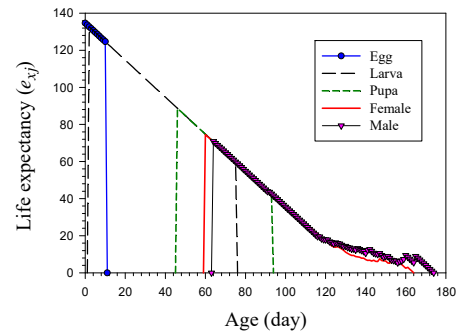
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Using  $l_x$  and  $l_x m_x$  to show the relative proportions and contributions of different reproduction types to the population

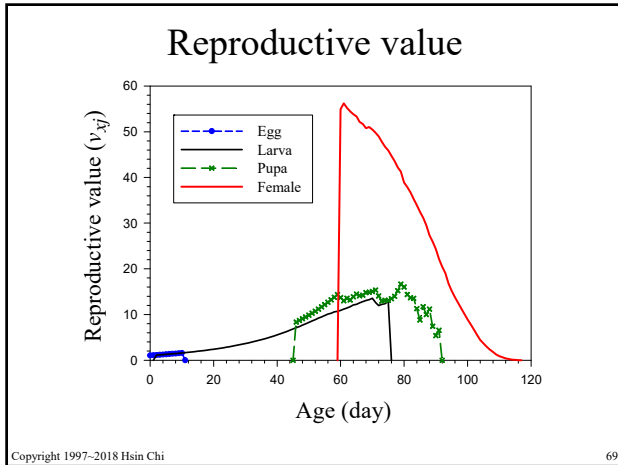


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Life expectancy



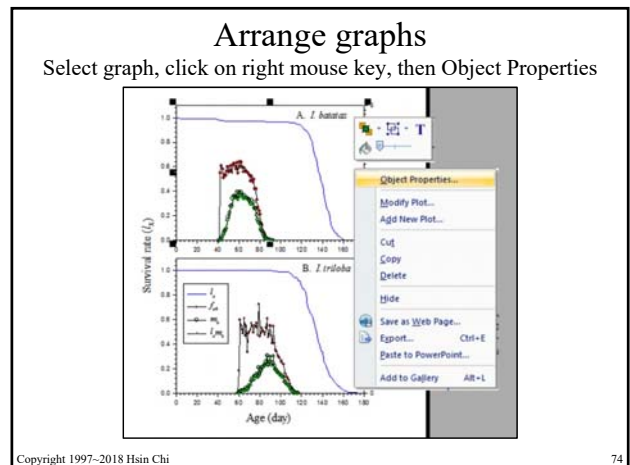
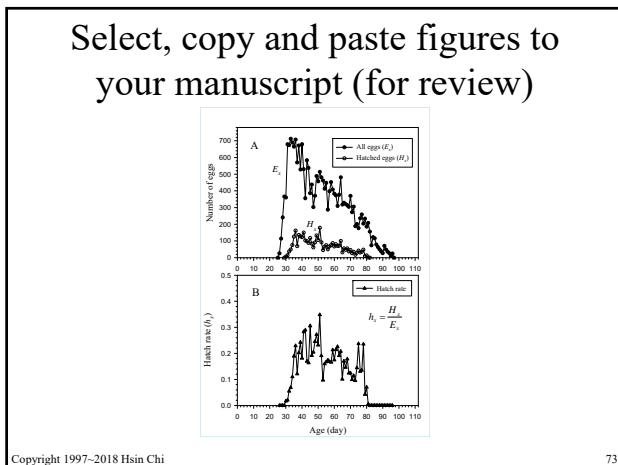
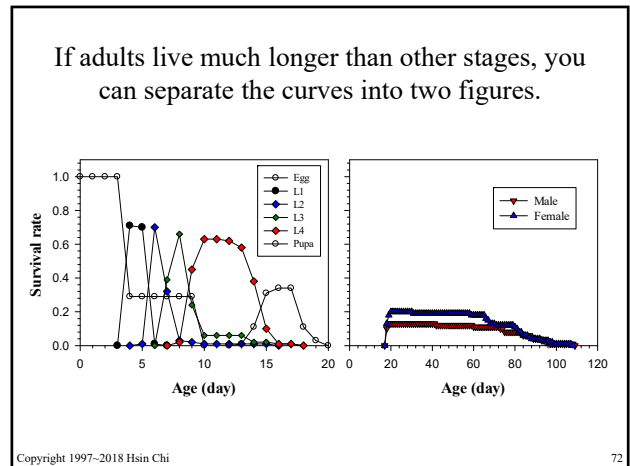
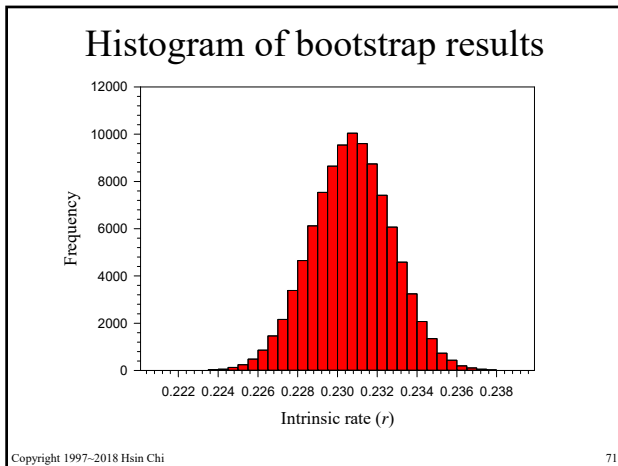
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### Prepare frequency histogram of bootstrap results

- In SigmaPlot, select Worksheet, and Import. Import data file with extension (`_Effective Boots-xx-in column.txt`), e.g., (`_Effective Boots-r-in column.txt`, `_Effective Boots-Ro-in column.txt`, `_Effective Boots-W_Longevity-in column.txt`, etc.)
- Select Analysis ➔ Histogram.

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### Arrange graphs

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### Arrange graphs: 2 graphs, portrait

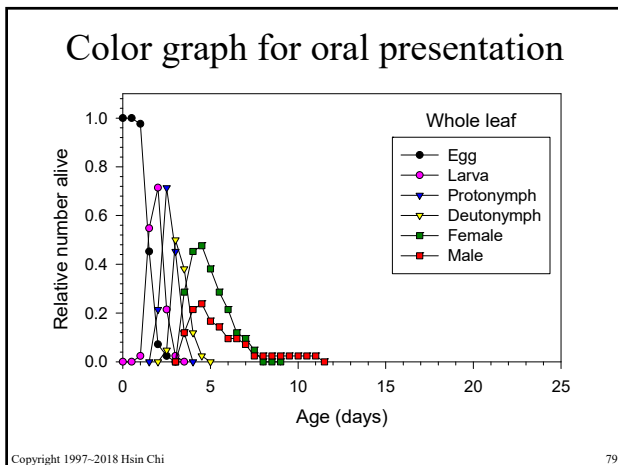
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### Arrange graphs: 4 graphs, landscape

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### Export high resolution figure (for publication)

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## Excel

Many scientists publish graphs prepared by using Excel, although their quality may be limited.

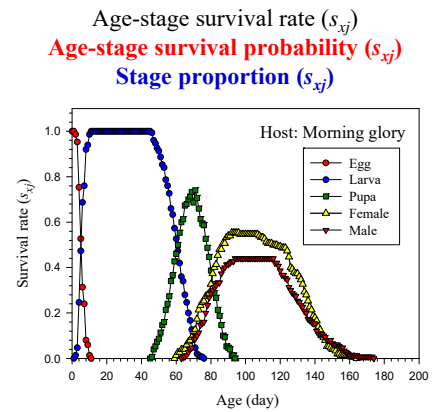
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## Excel Example

Figure 1: Age-stage survival rate ( $s_{xj}$ )

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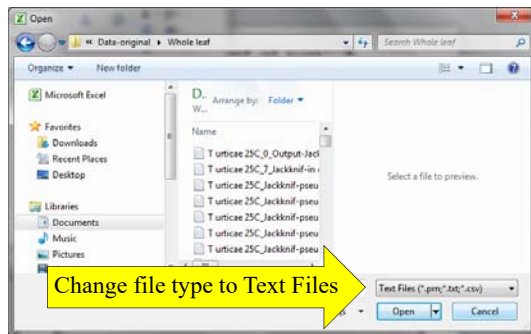
81



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82

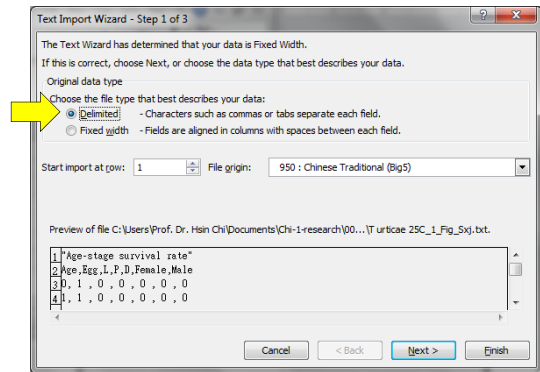
## Open graphic data file in Excel



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83

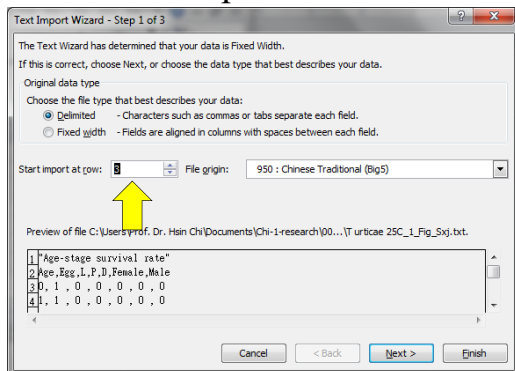
## Choose Delimited file type



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84

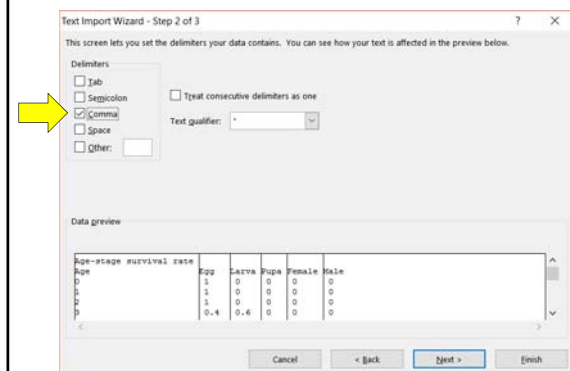
## Start import at row: 3



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85

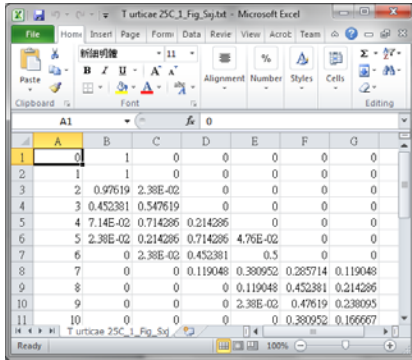
## Choose delimiter: Comma



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86

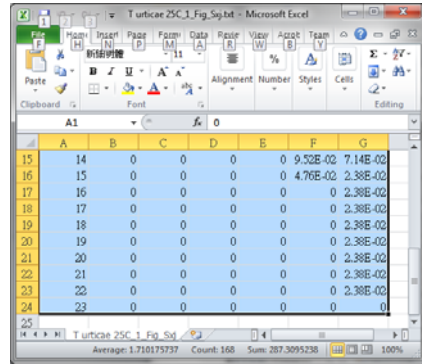
Data imported



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87

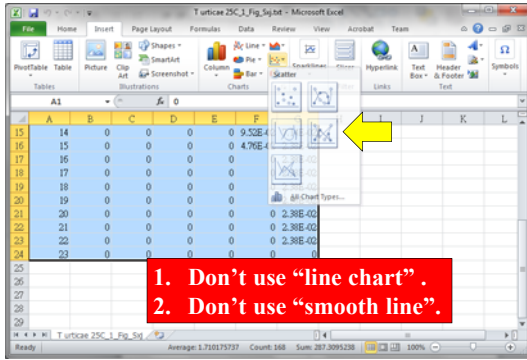
Select all data (Ctrl-A) (Command-A for Mac)



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88

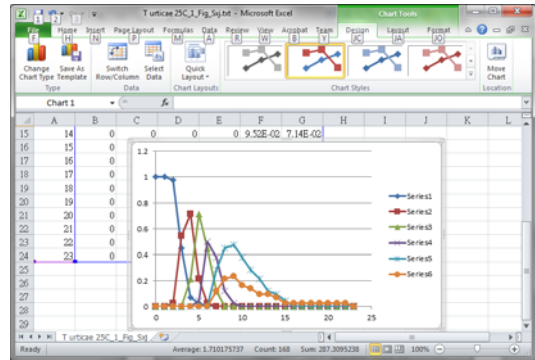
Insert *xy-scatter* chart



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89

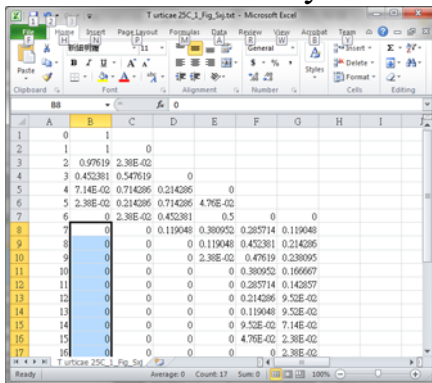
Survival rate ( $s_{xj}$ )



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92

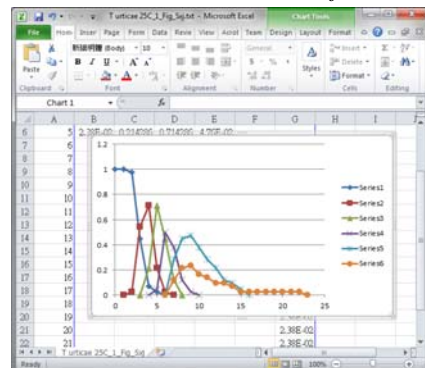
Delete unnecessary zeros



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93

Survival rate ( $s_{xj}$ )



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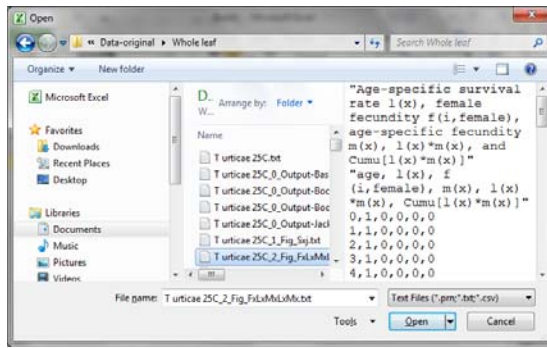
94

### General problems

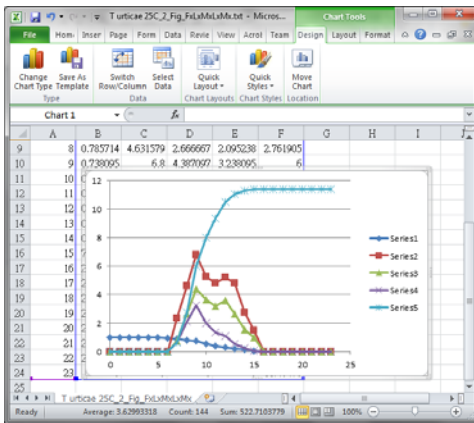
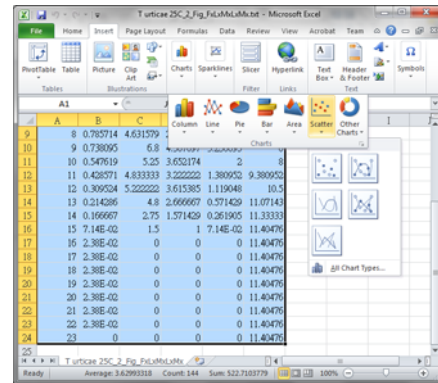
- X-axis from right to left: Click on axis, click on right mouse key. Change “Values in reverse order”.

### Excel Example: Figure 2: $l_x, f_{xj}, m_x, l_x m_x$ , and cumulative $l_x m_x$

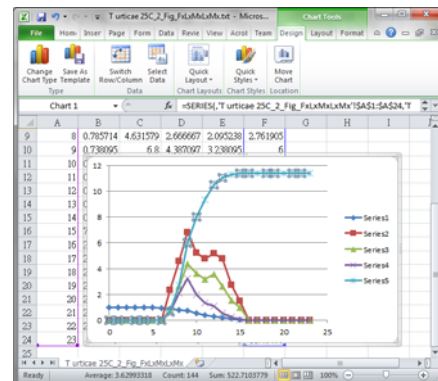
### Figure 2: $l_x, f_{xj}, m_x, l_x m_x$



### Select all → insert xy-scatter chart

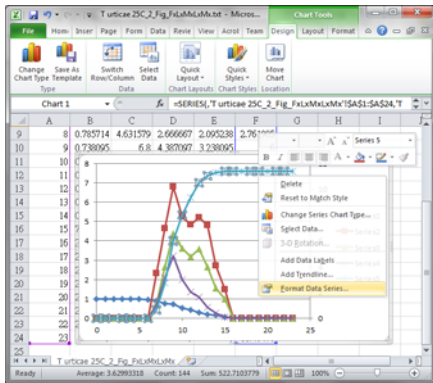


### Select line (cumulative $l_x m_x$ )





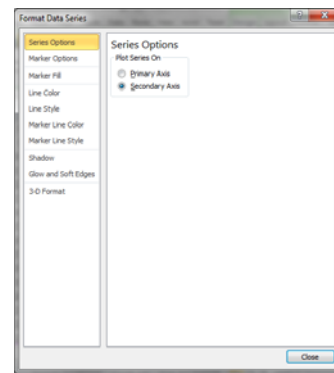
Right mouse key: Format Data Series



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101

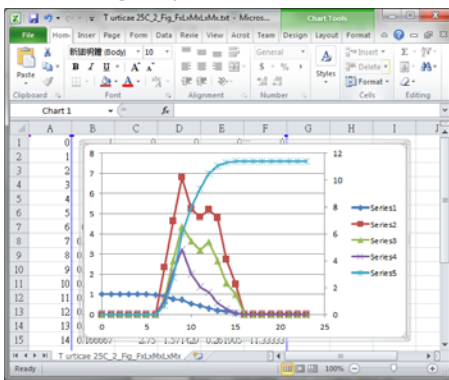
Use secondary axes for cumu.  $l_x m_x$



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102

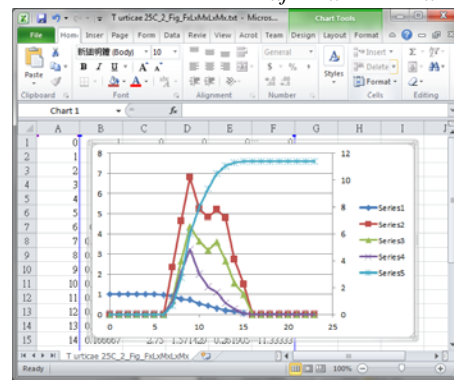
Right y-axis added



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103

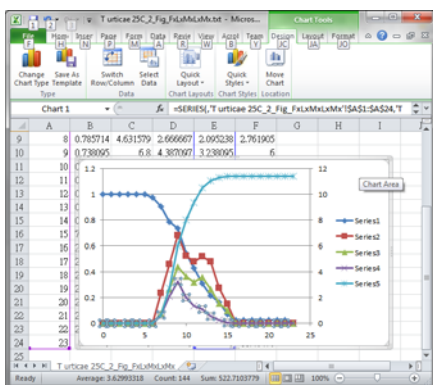
Use right y-axis for  $f_{x_j}$ ,  $m_x$ , and  $l_x m_x$



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104

Use left y-axis for  $l_x$ , right y-axis for others



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105

Save as **xlsx** file

After you have prepared your figure using Excel, you should click on “save as” to save it as a **xlsx** file, otherwise your txt file will be modified and cannot be used for another program.

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106

If you open any file in a different program,  
save it as a new file (xlsx, doc, etc.)

TWOSEX generates more than 100 files (txt files). You can import them to SigmaPlot, Excel, PowerPoint to prepare figures and tables, or run statistical analysis, etc. After that, you should save them as a new file with proper file extension, otherwise your txt file will be modified and cannot be used for other purposes.

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107



Teşekkür ederim!

سپاسگزارم

謝謝!

ขอบคุณครับ

Děkuji

Danke!

¡Muchas gracias!

Thank you!

ご清聴ありがとうございます!

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108