

LSOP Title	
Time Lapse Protocol	
LSOP No.	LSOP32
Version	1.1
Location	UQ Node/Centre-wide
Policy/Procedure Link	<a href="#">OGTR</a>
Risk Assessments	
Approved by	Elizabeth Dun
Date Approved	16/08/2021
Date Effective	18/06/2021
Next Review Date	18/06/2022
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## 1.0 Scope

*This procedure covers the set-up, dorgem software, initial dorgem set up, and measurement of buds in imageJ software for a time lapse protocol.*

*This LSOP does not cover growing the plants or how to quantify the data.*

## 2.0 Materials and Equipment

1. Scalpel
2. Pen
3. Black Felt
4. Ruler
5. Camera
6. Software

## 3.0 Prescribed Actions

The set up:

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1. Setup up the plants and cameras like in the image above
2. Remove some of the topsoil to clearly expose the bud
3. Remove the scale leaves with a scalpel
4. Use a felt pen with a sharp point to make a number of small dots on the stem close to the bud to create a number of possible reference points to help with measuring the buds
5. Place black felt behind the plant stem and a ruler next to the bud
6. Position the webcam parallel to the ruler

### Dorgem software

1. First time using Dorgem requires the user to select 'Microsoft WDM Image capture (Win32)'
2. Click 'Preview' if there is no preview
3. Click 'source'
  - a. Click the 'Capture source' tab
  - b. select the correct camera.
  - c. Click 'OK'
4. Click 'source'
  - a. Click the 'Source settings' tab
  - b. adjust the zoom, tilt and pan to get the best image of the bud
  - c. Click the 'Advanced' tab
  - d. Increase the 'Sharpness' to approximately 75%
  - e. Click 'OK'
5. Click 'Store settings'
  - a. Click either 'add' if there is no store setting or click the available store setting and then click edit.
  - b. Provide a name for the store setting if one is not present
  - c. Click 'enable'
  - d. Select the 'interval', that is how often images are to be recorded
  - e. Select the file storage location (where the images are to be saved) and filename
    - i. Filename should be in the format such as: %G test %g.jpg as this will give each image a unique time stamp
    - ii. The full filename may look like:
      1. C:\Users\guest\Documents\%G test %g.jpg
  - f. Click 'OK'

- g. Click 'Close'
  - h. Click 'Capture now' to ensure the file is named correctly and sent to the correct folder
6. When ready to start, Click 'Auto capture' and click 'Capture now' to start the timelapse

### Initial Dorgem set up

1. There is a number of timelapse photography software but Dorgem is the only one that seems to work well with multiple cameras. It does have its issues for example it needs to be run on Windows XP and the image size can't be made larger than 600x400.
2. For multiple cameras to operate you need to have multiple copies of Dorgem running. To do this, you need to make multiple shortcuts to start Dorgem and modify the shortcut so that each has a unique command-lines. For example, if there are 4 cameras, you need 4 shortcuts to dorgem with one of the following as the 'target' command (assuming Dorgem is installed in the C:\Program Files\Dorgem folder):
  - a. C:\Program Files\Dorgem\dorgem.exe /c:cam1
  - b. C:\Program Files\Dorgem\dorgem.exe /c:cam2
  - c. C:\Program Files\Dorgem\dorgem.exe /c:cam3
  - d. C:\Program Files\Dorgem\dorgem.exe /c:cam4

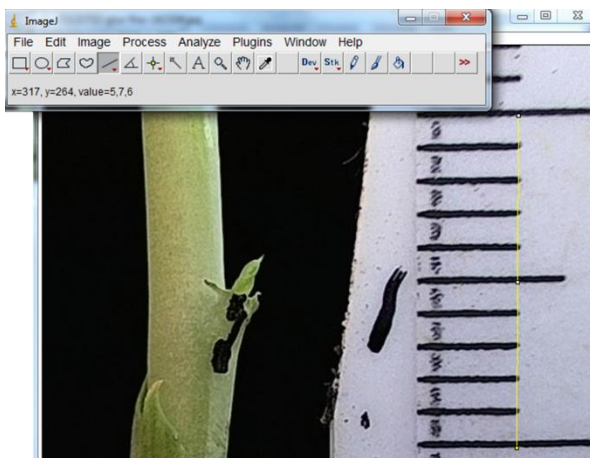
### Measuring bud lengths using Image J

1. Collect all the files recorded by Dorgem
2. Open the first image file in ImageJ
3. Click the straight-line icon
  - a. Draw a straight line across the ruler in the image perpendicular to the ruler as seen in the image below
  - b. Click Analyze
    - i. Click 'Set Scale'

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1. Enter the distance in mm into the 'known distance' field
  2. Record the picture scale (pixels/mm) for future reference
  3. Click 'OK'
- c. Check that the scale is correct by drawing a line across a different section of the ruler and then press 'm'. If the number is quite different from what you expect, keep repeating the set scale process until you are happy.



4. Zoom in on the bud by clicking the magnifying glass icon and clicking on the part of the image you want to zoom in on
5. Click the straight-line icon
  - a. Draw a line from the tip of the bud to the stable reference point on the image
  - b. Press 'm'
  - c. Press 'ctrl + shift + o'
6. Repeat measurements of the bud
7. Once all the data is measured, copy all the data in the 'Results' box and paste into Excel
8. Bud growth is measured by subtracting the initial bud measurement from all other values.

