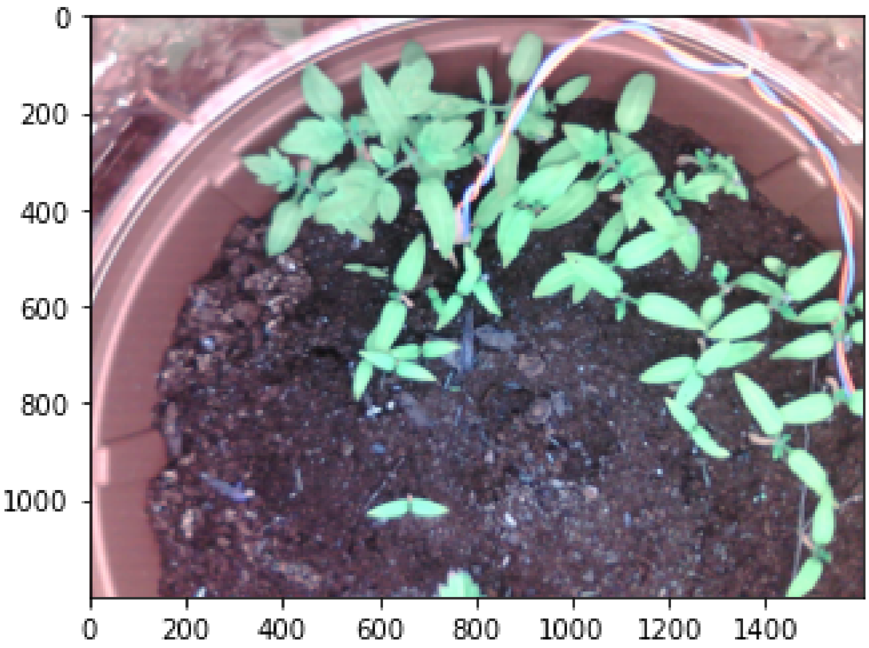
image_processing

May 13, 2021

[1]:
```
%matplotlib inline
from PIL import Image

filename = "../image/20210513122632.jpg"
image = Image.open(filename)
```

[2]:
```
import matplotlib.pyplot as plt
import matplotlib.image as mpimg
from plantcv import plantcv as pcv
img,f,r = pcv.readimage(filename, mode='rgb')
plt.imshow(img)
```

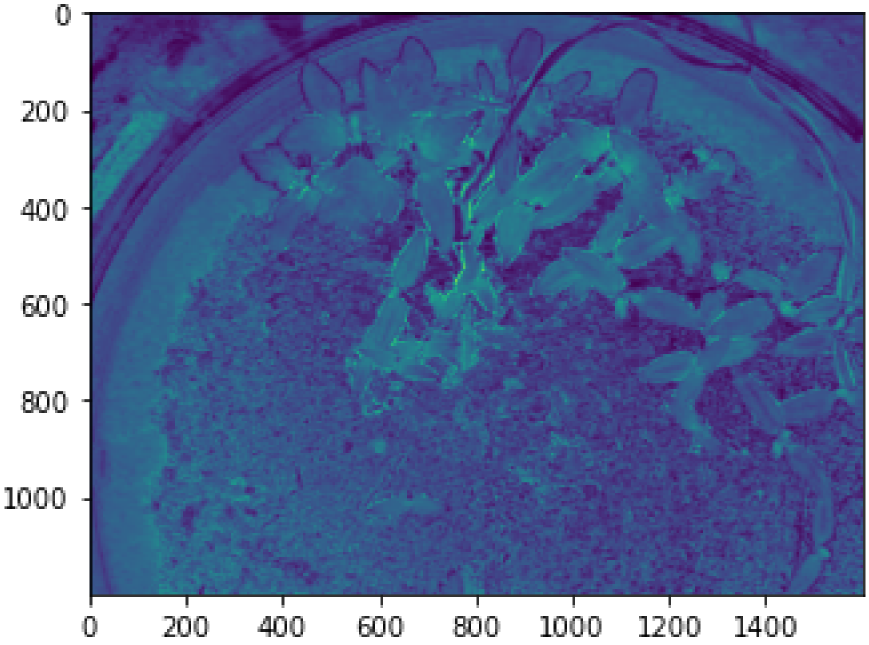
[2]:
```
<matplotlib.image.AxesImage at 0x7fc6421a8c10>
```



[3]:
```
s = pcv.rgb2gray_hsv(rgb_img=img, channel='s')
```

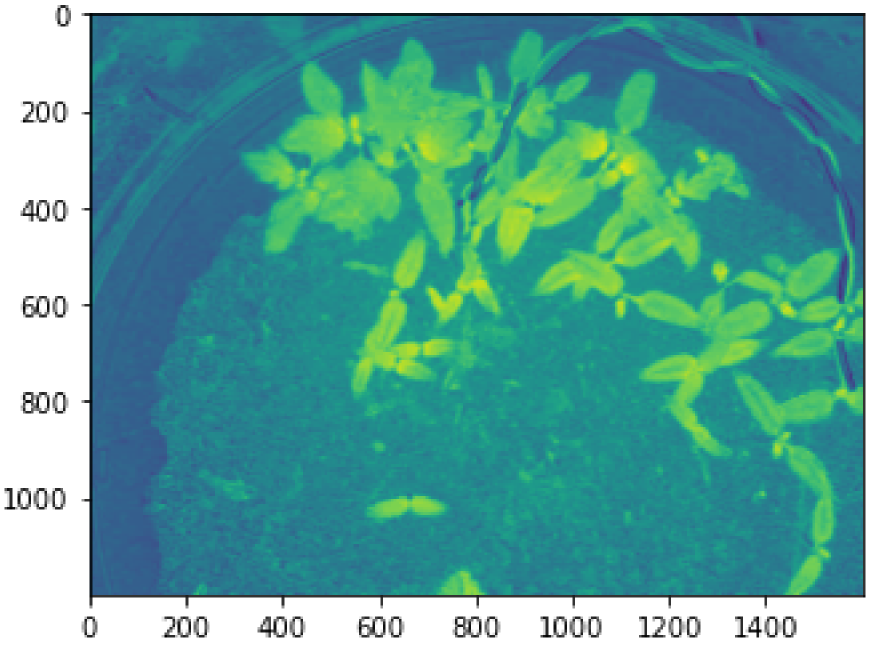
```
plt.imshow(s)
```

[3]: <matplotlib.image.AxesImage at 0x7fc6420ec2e0>



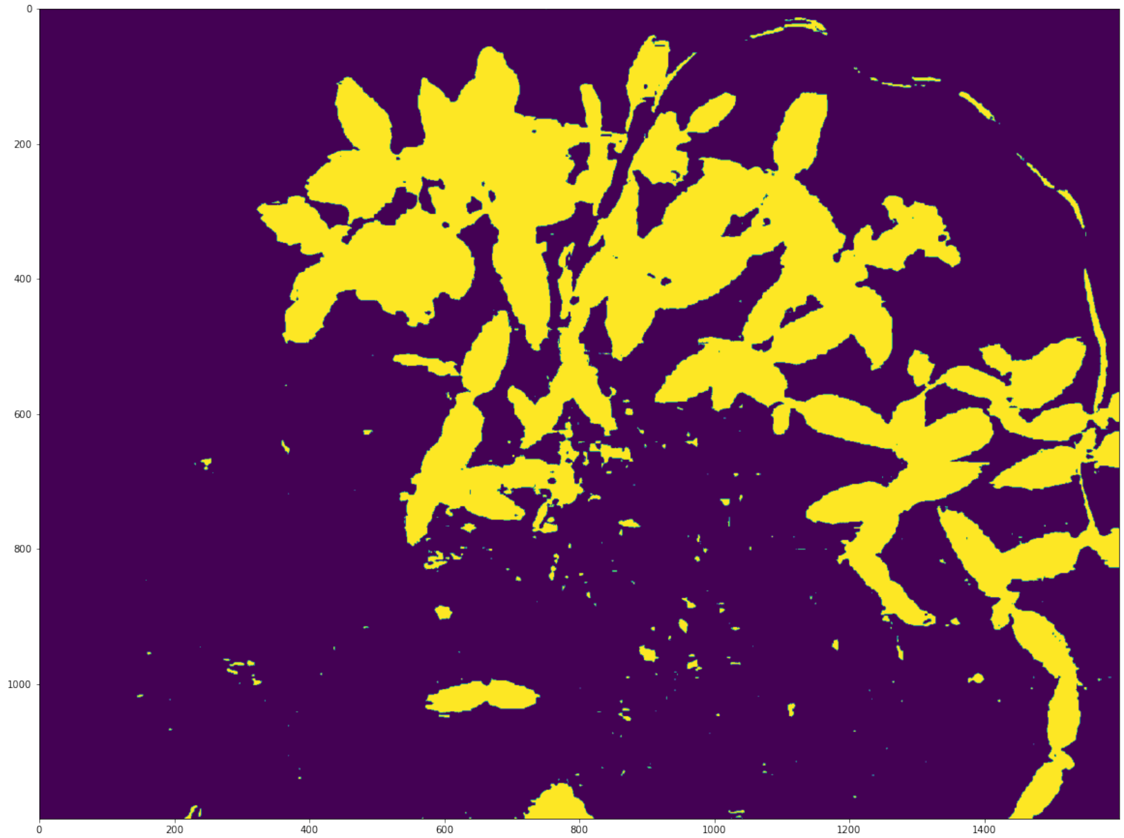
[4]:
```
b = pcv.rgb2gray_lab(rgb_img=img, channel='b')
plt.imshow(b)
```

[4]: <matplotlib.image.AxesImage at 0x7fc642052e20>



```
[5]: b_thresh = pcv.threshold.binary(gray_img=b, threshold=140, max_value=255,
                                      object_type='light')
     b_cnt = pcv.threshold.binary(gray_img=b, threshold=140, max_value=255,
                                   object_type='light')
     plt.figure(figsize = (20,30))
     plt.imshow(b_thresh)
```

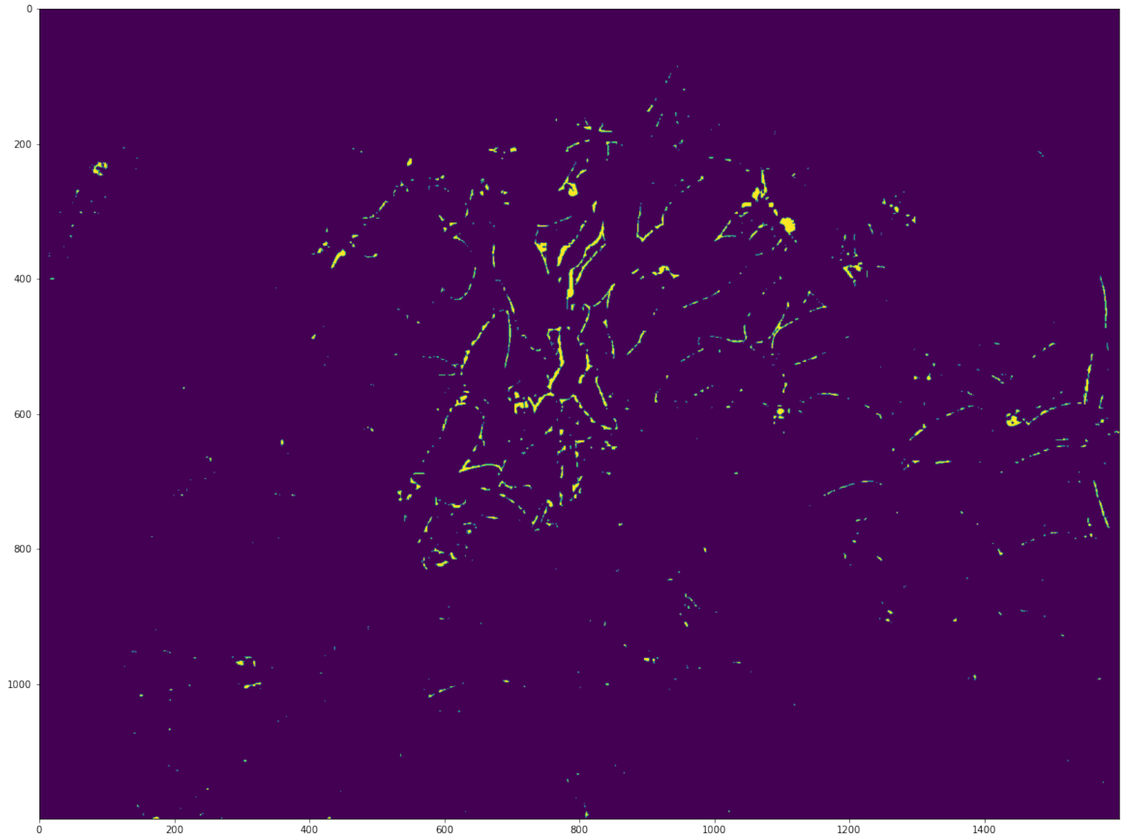
```
[5]: <matplotlib.image.AxesImage at 0x7fc641fc5610>
```



[ ]:

```
[6]: s_thresh = pcv.threshold.binary(gray_img=s, threshold=130, max_value=255,␣
      ↪object_type='light')
     plt.figure(figsize = (20,20))
     plt.imshow(s_thresh)
```

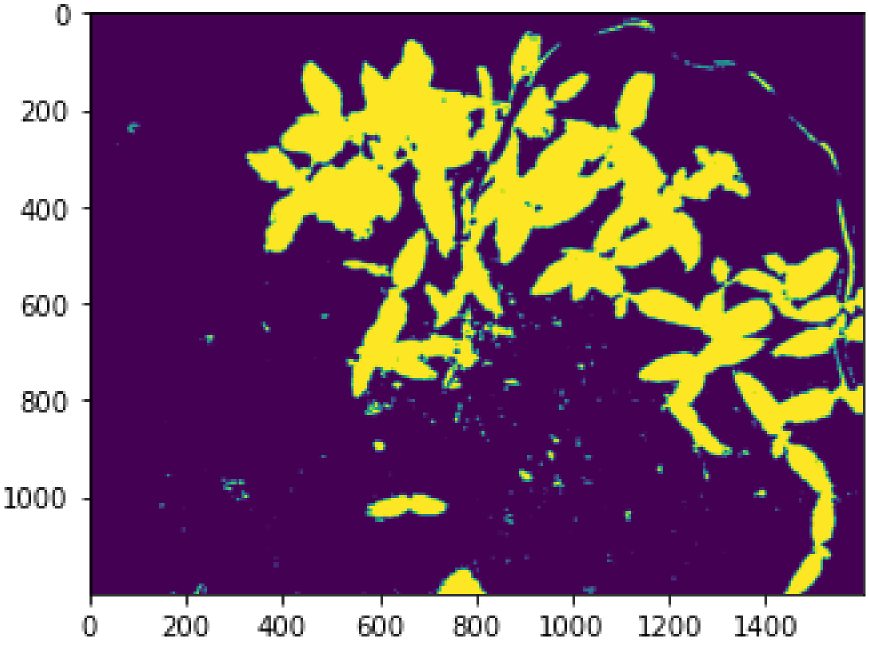
```
[6]: <matplotlib.image.AxesImage at 0x7fc641fb17c0>
```



[7]:
```
s_mblur = pcv.median_blur(gray_img=s_thresh, ksize=5)
s_cnt = pcv.median_blur(gray_img=s_thresh, ksize=5)
```

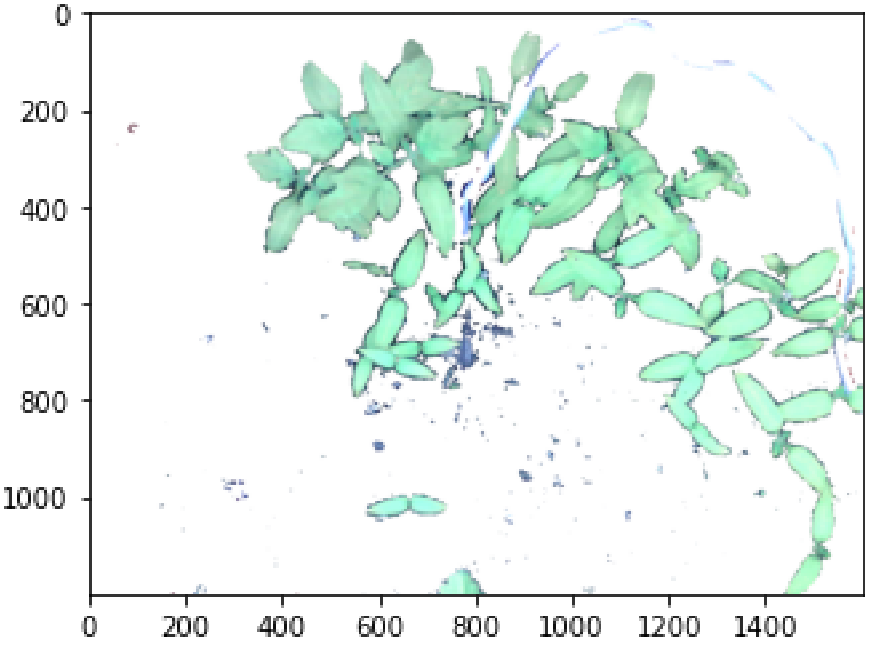
[8]:
```
bs = pcv.logical_or(bin_img1=s_mblur, bin_img2=b_thresh)
plt.imshow(bs)
```

[8]:
```
<matplotlib.image.AxesImage at 0x7fc6420aa7c0>
```



```
[9]: masked = pcv.apply_mask(img=img, mask=bs, mask_color='white')
     plt.imshow(masked)
```

```
[9]: <matplotlib.image.AxesImage at 0x7fc641e87370>
```

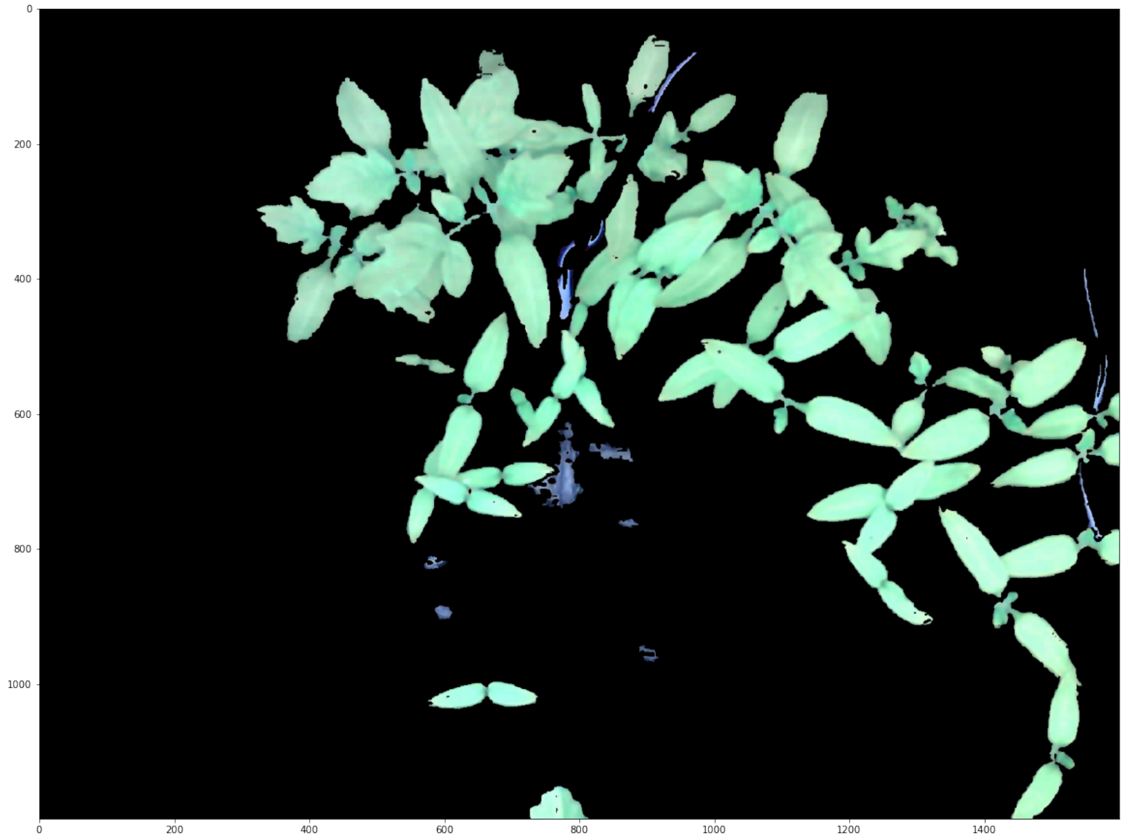


[10]:

```
# Convert RGB to LAB and extract the Green-Magenta and Blue-Yellow channels
masked_a = pcv.rgb2gray_lab(rgb_img=masked, channel='a')
masked_b = pcv.rgb2gray_lab(rgb_img=masked, channel='b')

# Threshold the green-magenta and blue images
maskeda_thresh = pcv.threshold.binary(gray_img=masked_a, threshold=115,
                                  max_value=255, object_type='dark')
maskeda_thresh1 = pcv.threshold.binary(gray_img=masked_a, threshold=135,
                                       max_value=255, object_type='light')
maskedb_thresh = pcv.threshold.binary(gray_img=masked_b, threshold=200,
                                      max_value=255, object_type='light')

# Join the thresholded saturation and blue-yellow images (OR)
ab1 = pcv.logical_or(bin_img1=maskeda_thresh, bin_img2=maskedb_thresh)
ab = pcv.logical_or(bin_img1=maskeda_thresh1, bin_img2=ab1)

# Fill small objects
# Inputs:
#   bin_img - Binary image data
#   size - Minimum object area size in pixels (must be an integer), and␣
↪smaller objects will be filled
ab_fill = pcv.fill(bin_img=ab, size=200)

# Apply mask (for VIS images, mask_color=white)
masked2 = pcv.apply_mask(img=masked, mask=ab_fill, mask_color='black')
plt.figure(figsize = (20,30))
plt.imshow(masked2)
```

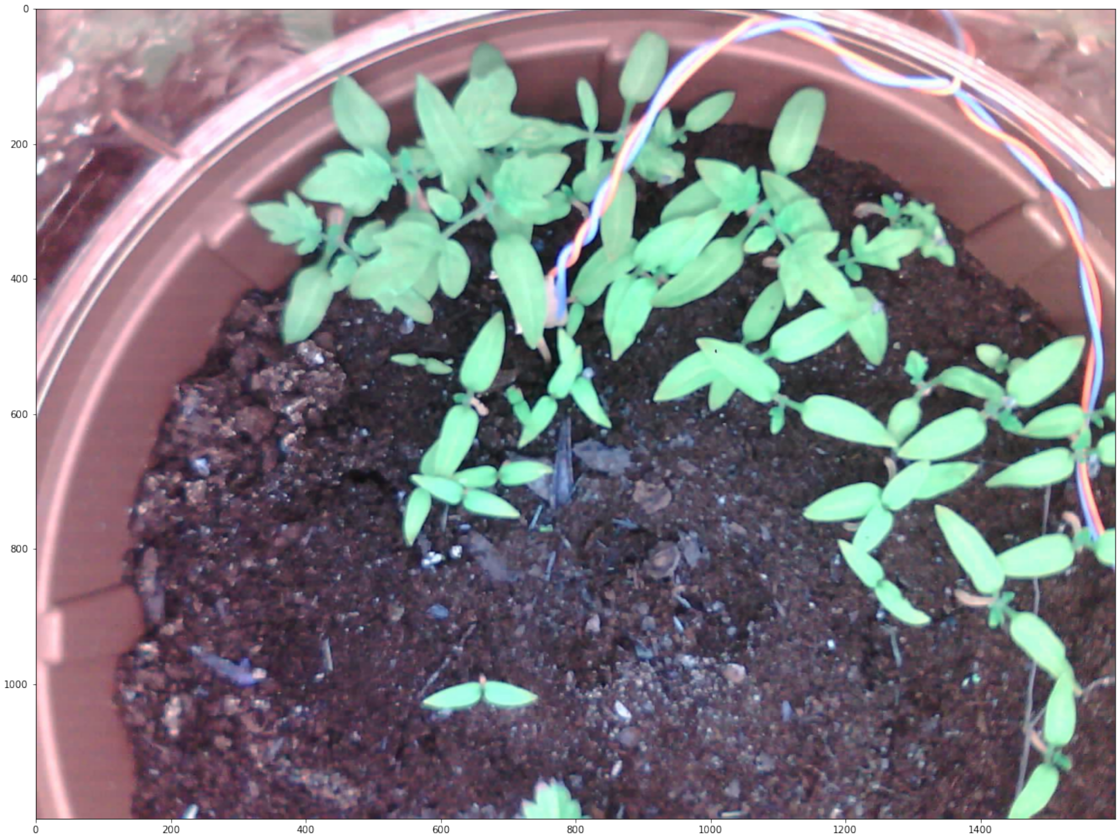
[10]:

```
<matplotlib.image.AxesImage at 0x7fc641dfa670>
```



```
[11]: # original image
      plt.figure(figsize=(20,20))
      plt.imshow(img)
```

```
[11]: <matplotlib.image.AxesImage at 0x7fc641ddd700>
```



[12]:

```
import numpy as np
shape = np.shape(masked2)
# print(masked2)
```

[13]:

```
nonblack = np.array([x > 0 for x in masked2])
#print(nonblack * 1)


indice = np.sum(nonblack) / 3
print(indice)
```

```
344769.3333333333
```