



Radimax 2021 rootdata - grass

This project note was made by Niels Alvin Faircloth Olsen, Copenhagen University in the project “Optimerede afgrøder til fremtidens landbrug”, supported by Promilleafgiftsfonden.

In 2021 there were 2 experiments, in the four beds in Radimax. In bed 3&4 a 250 grass lines from DLF’s breeding program were grown. During the season root imaging was done using imaging campaigns across the facility. In total over 400.000 images were taken across the whole facility. After imaging, the files were analyzed, using the automatic image analysis software, Rootpainter. During the project period a lot of resources were spent on optimizing the model in the software to recognize roots. One of the main challenges with grass roots is, that grassroots have a tendency to fade fast in the fall, and the models that recognize the wheat roots are not accurate for the grass roots. Therefore, KU developed a special model for the grass images. After analysis of the root images, the first step is cleaning the data for false positives. The cleaned dataset is a list of lines with different root data at different dates. The list has been delivered to DLF. The data can support the selection of lines in a grass blend, and the information can be used to select breeding parents. Finally, the breeders can use the phenotypic data to develop genetic tools to breed for root depth.

The data was given to DLF together with a short information about the image model and tube depth. Here the information for grass models is given, and an example of root data is shown. For grass there is four data files more than 38.000 rows in each file.

Example of datafile for grass.

	A	B	C	D	E	F	G	H	I
1	tube,"Year","ID","bed","line","X","camera","pipe_depth","date","root_length","depth","soil_depth"								
2	301,2021,"KU","3","Maqui",3101,"Cam3",596,"2021-04-27",0,600,37.9								
3	301,2021,"KU","3","Maqui",3101,"Cam3",631,"2021-04-27",0,29,630,38.7								
4	301,2021,"KU","3","Maqui",3101,"Cam3",664,"2021-04-27",0,660,39.5								
5	301,2021,"KU","3","Maqui",3101,"Cam3",702,"2021-04-27",0,08,700,40.6								
6	301,2021,"KU","3","Maqui",3101,"Cam3",734,"2021-04-27",0,730,41.4								
7	301,2021,"KU","3","Maqui",3101,"Cam3",769,"2021-04-27",0,17,770,42.5								
8	301,2021,"KU","3","Maqui",3101,"Cam3",805,"2021-04-27",0,800,43.3								
9	301,2021,"KU","3","Maqui",3101,"Cam3",840,"2021-04-27",0,840,44.4								
10	301,2021,"KU","3","Maqui",3101,"Cam3",874,"2021-04-27",1,78,870,45.3								
11	301,2021,"KU","3","Maqui",3101,"Cam3",911,"2021-04-27",0,910,46.3								
12	301,2021,"KU","3","Maqui",3101,"Cam3",944,"2021-04-27",0,940,47.2								
13	301,2021,"KU","3","Maqui",3101,"Cam3",980,"2021-04-27",0,980,48.2								
14	301,2021,"KU","3","Maqui",3101,"Cam3",1014,"2021-04-27",0,1010,49.1								
15	301,2021,"KU","3","Maqui",3101,"Cam3",1049,"2021-04-27",0,1050,50.2								
16	301,2021,"KU","3","Maqui",3101,"Cam3",1085,"2021-04-27",0,1080,51								
17	301,2021,"KU","3","Maqui",3101,"Cam3",1120,"2021-04-27",0,1120,52.1								
18	301,2021,"KU","3","Maqui",3101,"Cam3",1156,"2021-04-27",0,9,1160,53.1								
19	301,2021,"KU","3","Maqui",3101,"Cam3",1190,"2021-04-27",0,2,1190,54								
20	301,2021,"KU","3","Maqui",3101,"Cam3",1225,"2021-04-27",0,1220,54.8								
21	301,2021,"KU","3","Maqui",3101,"Cam3",1259,"2021-04-27",0,1260,55.9								
22	301,2021,"KU","3","Maqui",3101,"Cam3",1294,"2021-04-27",0,97,1290,56.7								
23	301,2021,"KU","3","Maqui",3101,"Cam3",1331,"2021-04-27",0,1330,57.8								
24	301,2021,"KU","3","Maqui",3101,"Cam3",1366,"2021-04-27",0,1370,58.9								
25	301,2021,"KU","3","Maqui",3101,"Cam3",1401,"2021-04-27",0,6,1400,59.7								
26	301,2021,"KU","3","Maqui",3101,"Cam3",1435,"2021-04-27",0,1440,60.8								
27	301,2021,"KU","3","Maqui",3101,"Cam3",1470,"2021-04-27",0,1470,61.6								
28	301,2021,"KU","3","Maqui",3101,"Cam3",1505,"2021-04-27",0,9,1500,62.4								
29	301,2021,"KU","3","Maqui",3101,"Cam3",1540,"2021-04-27",0,28,1540,63.5								
30	301,2021,"KU","3","Maqui",3101,"Cam3",1576,"2021-04-27",0,1580,64.6								
31	301,2021,"KU","3","Maqui",3101,"Cam3",1610,"2021-04-27",0,1610,65.4								
32	301,2021,"KU","3","Maqui",3101,"Cam3",1645,"2021-04-27",0,1640,66.2								

Grass imaging

Grass10

Imaged from 26/4-29/4 2021. Start depth in tube 5500, end depth in tube 600. Images analyzed with model for young root.

Grass11

Imaged from 31/5-2/6 2021. Start depth in tube 5500, end depth in tube 600. Images analyzed with model for young root.

Grass12

Imaged from 28/6-30/6 2021. Start depth in tube 5500, end depth in tube 600. Images analysed with model for young root.

Grass13

Imaged from 28/6-1/7 2021. Start depth in tube 5500, end depth in tube 600. Images analysed with model for young root and model for older roots.

Grass14

Imaged from 1/9-3/9 2021. Start depth in tube 5500, end depth in tube 600. Images analysed with model for young root and model for older roots.