www.slu.se

Pressure Mapping Sugar Beets

Droppin’ Beæts

CONCLUSIONS

- **Type matters: Small differences in pressures between yield type-representative varieties were seen**
- **Size matters: in dynamic tests, larger beets were subjected to larger forces, but smaller pressures**
- **Converting dynamic impacts to static loads appears possible**

OBJECTIVES

1. Investigate the size of impact stresses that sugar beets may be exposed to during harvest and transport
   - Force, contact area, & pressure
   - Differences between beet types
   - Differences between beet size
2. Further develop assessment method, inc. converting dynamic to static

METHOD

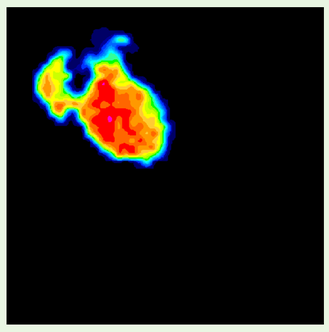
STATIC:

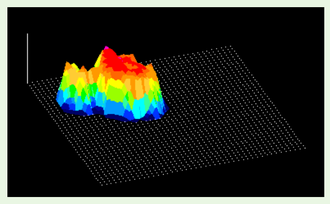
- **Equipment**: Tekscan I-Scan 7.70, 15,5 sensels / cm^2
- **Force***:* 500, 1000, & 2000 N

DYNAMIC:

- **Impact**: 1 meter drop, contact at widest part of beet
- **Framework**: Impulse
- **Time**: 1000 frames/ sec camera
- **Area**: Carbon paper + Photoshop

$$\int_{t_1}^{t_2} F dt = m\Delta v$$

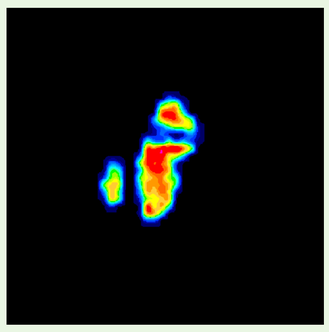


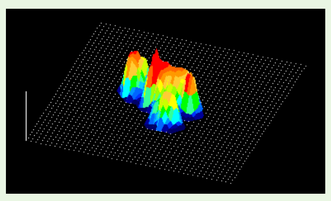


Example pressure maps of a static load applied to sugar beets.

2D (left) and 3D (right).

Sensor size: 112mm x 112mm

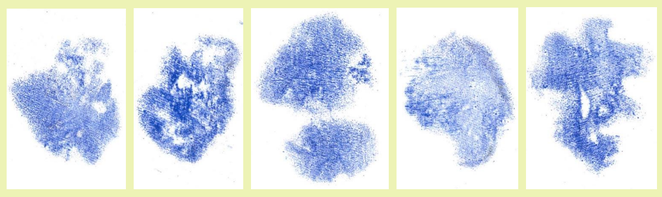


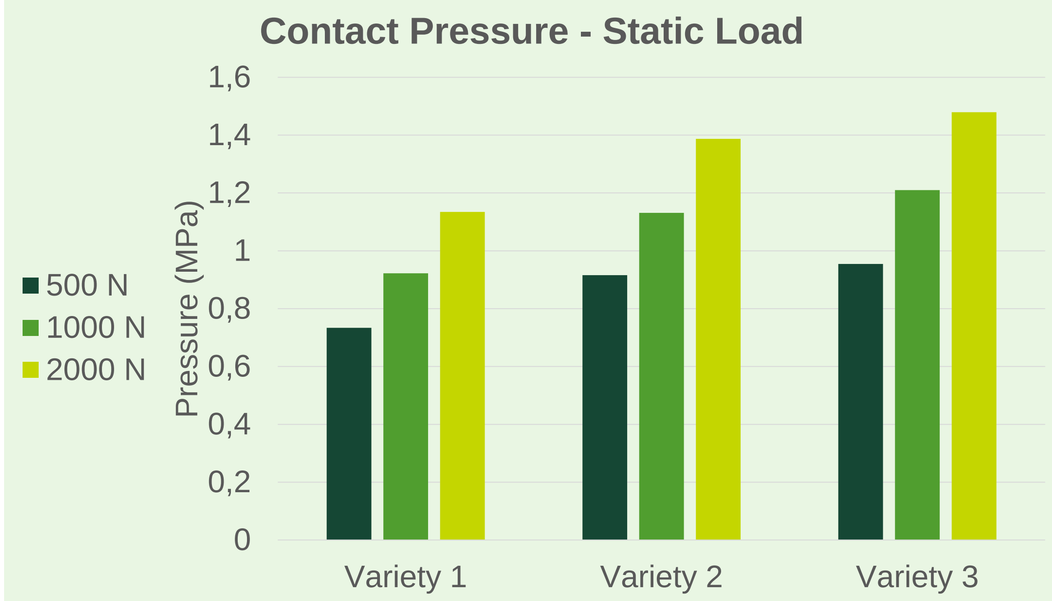


STATIC

DYNAMIC

https://youtu.be/EXYxnzVZJ80





	VARIETIES			SIZE		
	1	2	3	LARGE	SMALL	RATIO
WEIGHT (kg)	0,98	1,10	1,06	2,56	0,90	2,8
TIME (sec)	0,0037	0,0034	0,0033	0,0053	0,0031	1,7
FORCE (N)	1219	1419	1427	2217	1317	1,7
AREA (cm^2)	6,3	9,6	6,9	19,4	6,2	3,1
PRESSURE (MPa)	1,9	1,5	2,1	1,3	2,2	0,6
N	10	10	10	10	10	

Madeleine Nilsson
meni0003@stud.slu.se

William English
william.english@slu.se

Evgenij Telezhenko
evgenij.telezhenko@slu.se

SCIENCE AND EDUCATION FOR SUSTAINABLE LIFE