

# Prediction of the firmness of the selected sunflower hybrid seed based on its technological characteristics

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## Aim

This paper examines the technological characteristics of sunflower seeds of selected hybrids (bulk and true density, mass of 1000 seeds expressed on dry matter and content of hull in seeds), based on which a mathematical model for prediction of seed firmness was made.

## Materials

Examined samples, seeds of hybrids: (a) NS Horizont, (b) Sumo 2 OR, (c) NS Sumo Sjaj, (d) NS Samuraj CLP and (e) NS Smaragd CLP, were grown on small plot trials of Institute of Food and Vegetable Crops in 2017. The seed was cleaned and 6 months after the harvest, bulk density, true density, mass of 1000 seeds, hull content and firmness, were examined.

## Results

The obtained values of the tested technological characteristics

Hybrid	Bulk density (kg m <sup>-3</sup> )	True density (kg m <sup>-3</sup> )	Mass of 1000 seeds (g)	Hull content (%)	Firmness (g)
NS Horizont	463,20 ± 0,00	793,06 ± 12,68	57,10 ± 2,52	28,84 ± 0,27	6889,10 ± 1220,62
Sumo 2 OR	436,20 ± 0,85	753,92 ± 18,23	48,83 ± 0,80	29,87 ± 0,87	6608,53 ± 937,59
NS Sumo Sjaj	510,00 ± 0,57	877,33 ± 0,93	49,56 ± 0,64	26,68 ± 0,13	5522,67 ± 765,40
NS Samuraj CLP	471,20 ± 4,53	782,11 ± 21,35	49,40 ± 4,67	27,82 ± 0,48	6620,55 ± 1076,09
NS Smaragd CLP	477,60 ± 4,53	823,47 ± 2,40	49,30 ± 2,57	29,28 ± 0,83	6731,33 ± 1176,48

Mathematical models for seed firmness predicting

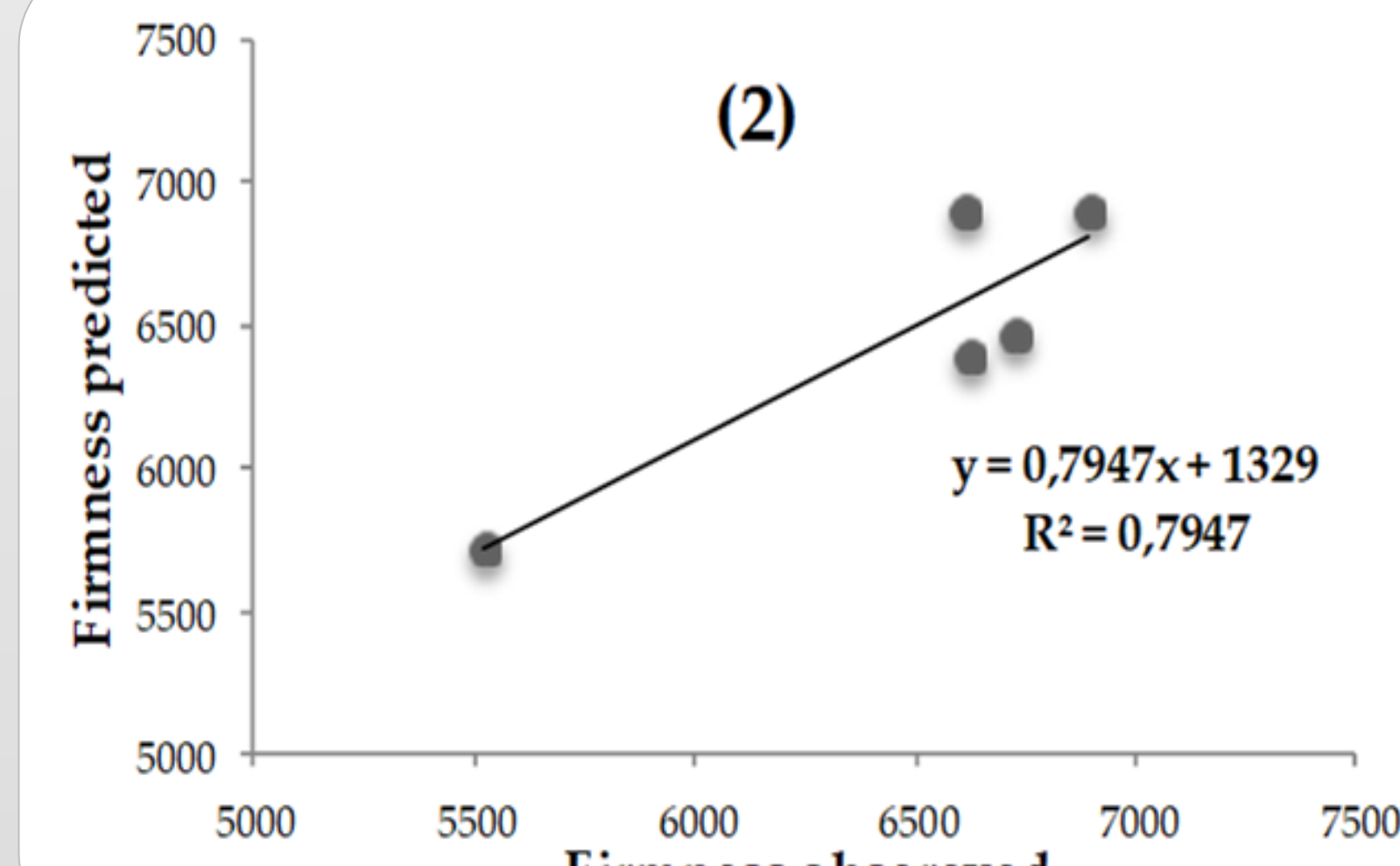
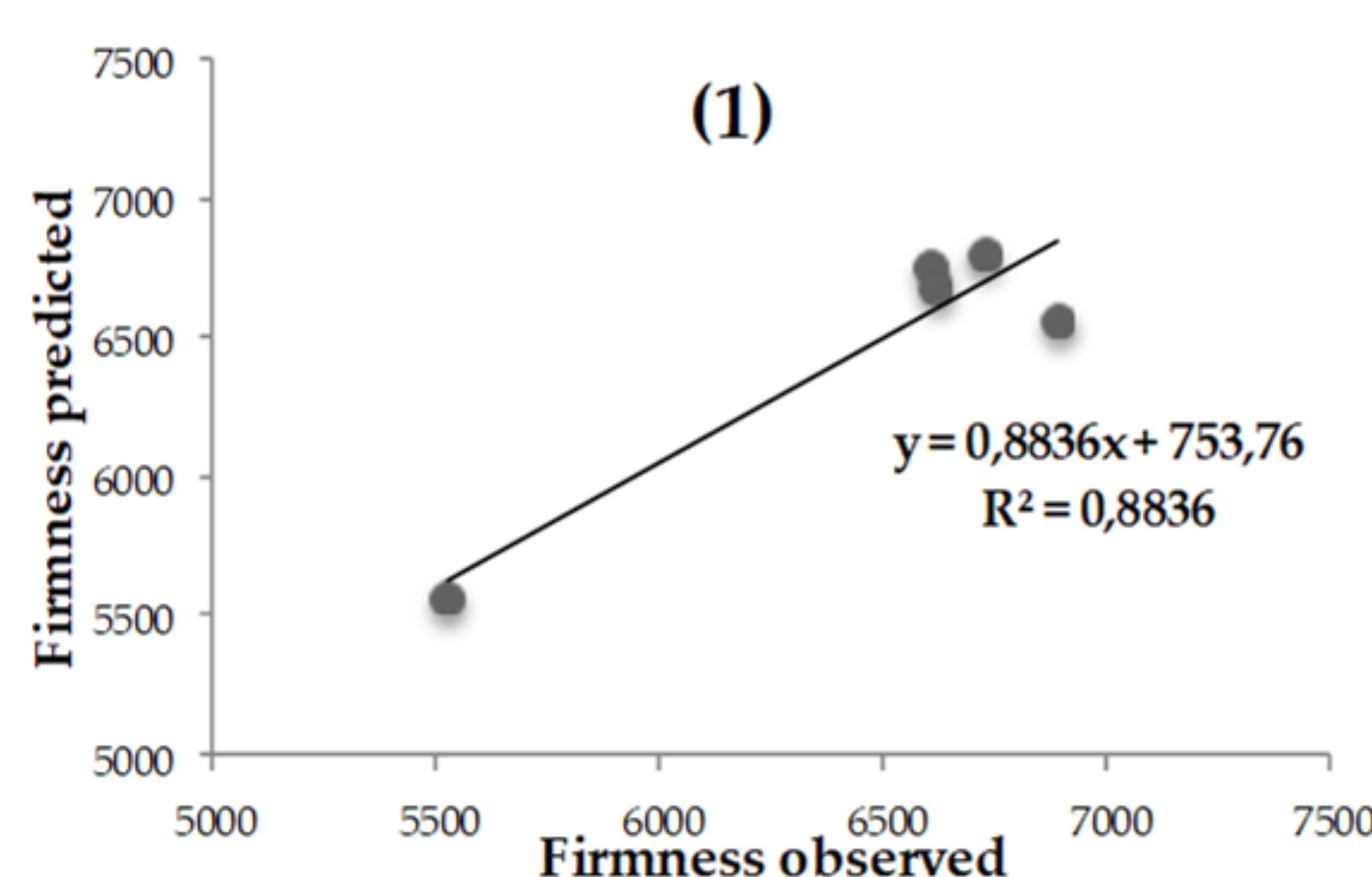
$$Y = b (\pm SE) + a_1 (\pm SE)_1 \cdot X_1 + \dots + a_n (\pm SE)_n \cdot X_n$$

Model M1: Firmness = -14694.99 (±18519.72) + 54.65 (±43.51) · Bulk density - 26.81 (±18.37) · True density + 596.53 (±382.4406) · Hull content

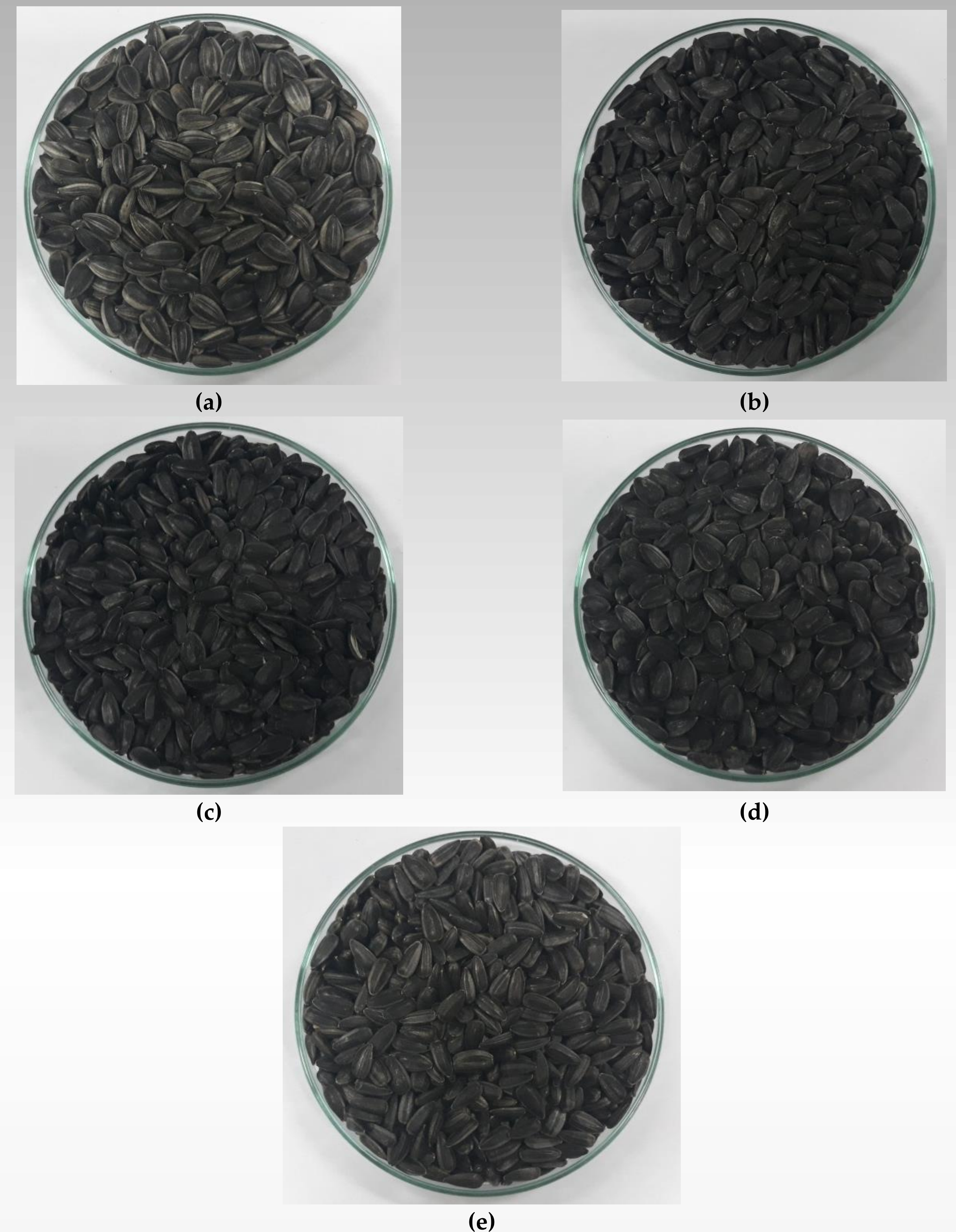
Model M2: Firmness = 2206.53 (±14072.42) - 4.71 (±7.80) · True density + 47.91 (±70.49) · Mass of 1000 seeds + 197.52 (±290.22) · Hull content

Parameters	Model	
	M1	M2
R	0.9400	0.8915
R <sup>2</sup>	0.8836	0.7947
F	2.53	1.29
p	0.4259	0.5565

Validation parameters for statistical validation of obtained models



Graphs of predicted versus experimentally observed seed firmness values



## Conclusions

The results obtained indicate that there is a significant negative correlation between seed firmness and bulk and true density and a significant positive correlation with hull content, while with 1000 seed mass the correlation is extremely weak. Based on the obtained models, it is concluded that the prediction of sunflower seed firmness is possible on the basis of parameters that are more easily to determine. These characteristics are possible through seed firmness to correlate with the dehulling efficiency, which significantly affects the seed pressing and the „lifetime“ of the presses.