

Production: RICE

Objective: Comparison of hardness and stickiness of four varieties of cooked rice

Type of action: Compression test

Test mode settings:

Speed	Test mode	Trigger	Target	Hold
0.5 mm/s	Strain (c)	3 gf	90 %	0 sec

Accessory:

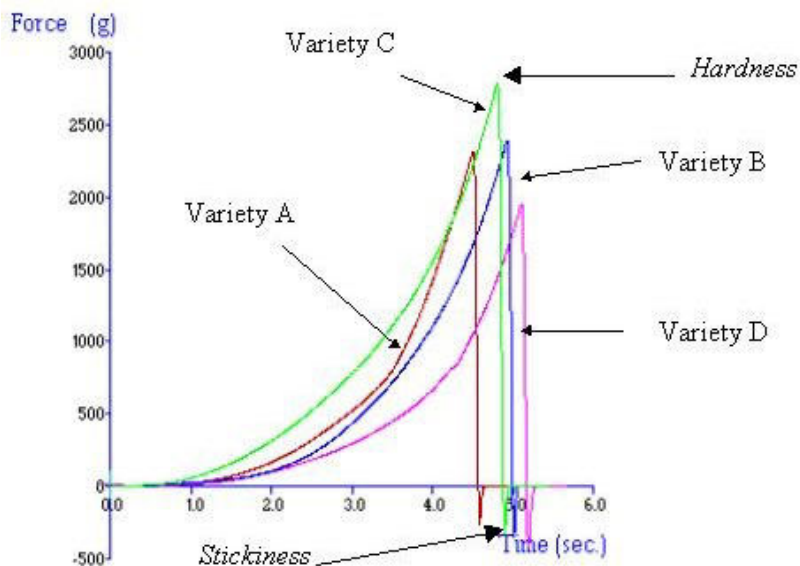
φ 36 mm cylinder probe, Platform

Test Set-Up:

Before carrying out a compression test in strain, one must calibrate the probe to acknowledge the bed surface. To do this, lower the probe, so that it is close to the bed surface. Click on **CALIBRATE HEIGHT** and specify the distance that you want the probe to return to, after sample compression, for each test - e.g. **15mm** is suggested.

Select three cooked grains of rice and position them centrally under the probe. The compression test is now ready to commence.

Typical plots:



The above curves were produced from 4 varieties of rice, tested 10 minutes after being cooked for 20 minutes.

Observations:

Once the trigger force is attained the graph proceeds to plot the effect on each rice variety under compression. When the samples have been compressed to 90% of their size the probe then proceeds to return (at maximum speed) at which point the stickiness parameter is measured. This value is the force required to separate the probe from the sample surface after compression has taken place. The graphs indicate that variety C is by far the hardest cooked rice variety. Conversely Variety D has the lowest hardness value which is accompanied by the highest stickiness value. Variety A is considered to be the least sticky variety which is accompanied by what appears to be an average hardness value.

Data Analysis:

☒ Max Force

Results

Rice Variety	Mean Maximum +ve Force 'Hardness' (+/- S.D.) (g)	Mean Maximum -ve Force 'Stickiness' (+/- S.D.) (g)
A	2335.1 +/- 113.6	-198.0 +/- 39.0
B	2468.2 +/- 268.4	-392.3 +/- 27.2
C	2968.6 +/- 290.1	-329.9 +/- 29.7
D	1955.5 +/- 181.2	-421.9 +/- 8.8

Notes:

- It may be preferable to compress the sample to a greater/lesser extent. This will subsequently increase both the hardness and stickiness values. Any values obtained are only relative to the specified strain to which they are compressed.
- The sample preparation procedure and handling of the sample before testing are considered to be variable conditions. It is important to identify these and keep them constant for comparison purpose.
- When attempting to optimize test settings it is suggested that the first tests are performed on the hardest samples to anticipate the maximum testing range required and ensure that the force capacity allows testing of all future samples.
- Within the rice industry a calculation of Maximum +ve Force divided by Maximum -ve Force is commonly taken. This ratio calculation can be easily added in table and gives an overall 'balance' assessment of the rice texture.

Balance = Max force / Min force