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(*Pisum sativum* L.) varieties

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Evaluating the sensory characteristics of underutilised and forgotten pea (*Pisum sativum* L.) varieties

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Evaluating the sensory characteristics of underutilised and forgotten pea (*Pisum sativum* L.) varieties.

Global agrobiodiversity is declining, resulting in food and nutrition insecurity, reduced dietary diversity, and threats to culinary heritage. This decline is partly due to the homogenisation of the global food supply [1]. Post-Green Revolution standardisation has led to a reliance on just 15 crops for up to 90% of global food production, with many minor and traditional crops fading from consumer plates [2]. The term "Forgotten Crops" refers to those crops and varieties that have fallen out of fashion or play marginal roles in contemporary food systems. These neglected crops hold significant economic, societal, and sensory potential, which could be harnessed through innovative gastronomic approaches [3-5]. Despite their advantageous traits, many traditional cultivars face challenges in food systems. Their unique flavours may be less appealing due to consumer preferences for the uniformity and reliability of commercial cultivars [6,7]. Unlike extensively bred commercial crops (c-type), many traditional varieties (f-type) have not undergone intensive breeding, resulting in spontaneous sensory and visual traits. This lack of uniformity can limit their practicality in cooking and meal preparation, making them less attractive to modern consumers and food supply actors. Further exploration and integration of these crops could enhance food diversity, nutrition security and increase the sustainability of the food systems [2,8,9].

Project title: This poster is part of a PhD project titled: "Increasing food and nutrition security through the diversification of food supply chains with forgotten edibles".

Aim and objectives:

Peas (*Pisum sativum* L.) varieties have been selected as a case study for exploring the sensory potential of forgotten crop varieties. There are over 3000 pea varieties stored at various UK seedbanks, however, only a handful of those are used in wider food systems today. The aim of this study was to measure and compare sensory performance of different types of peas as routes to crop revival [10].

Hypothesis: There are significant differences in sensory 'performance' between individual pea cultivars and between the 'f-type' and 'c-type' groups.



Image 1: Examples of 'forgotten' pea cultivars after harvest.

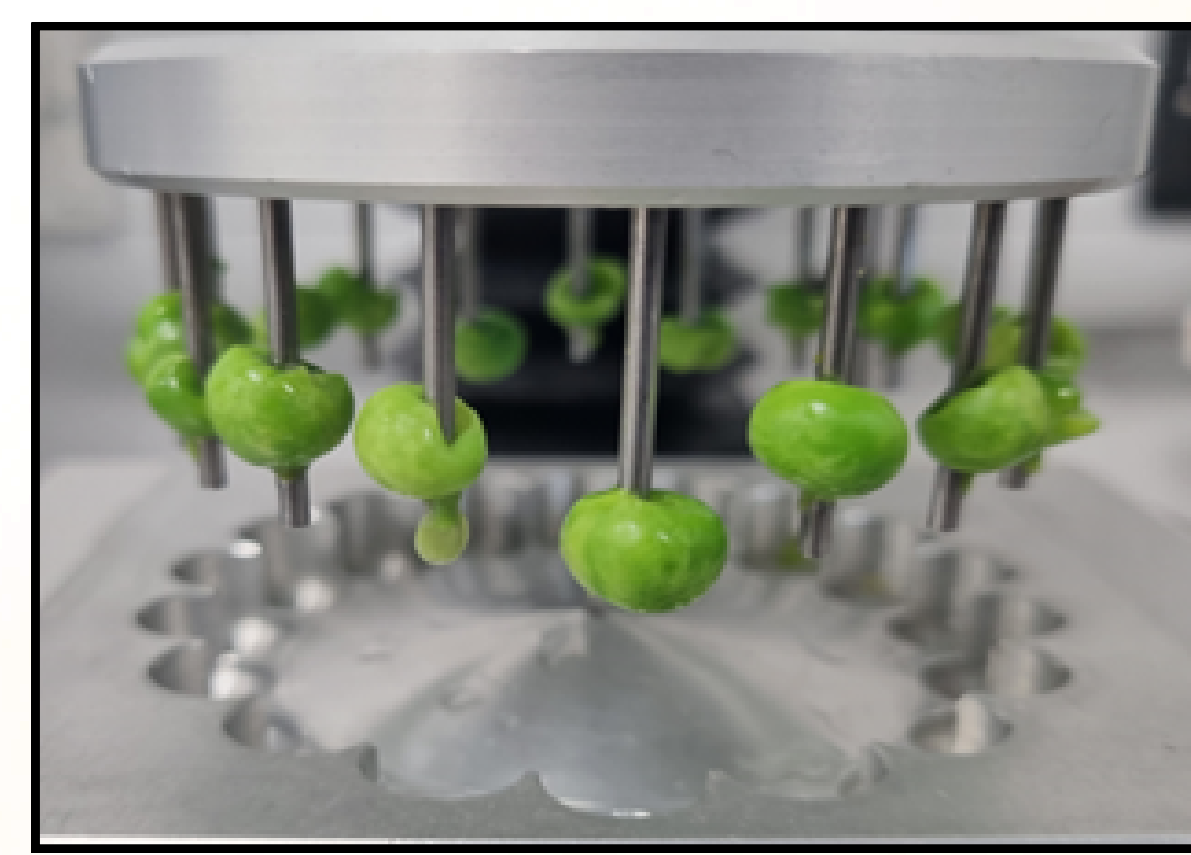


Image 2: Measuring pea hardness using the Pea Probe.

Methodology: The study has adopted a mixed methods approach, firstly it includes a case study on textural characteristics of 9 UK f-type pea varieties and comparison to 3 most popular UK c-type cultivars. This has been carried out using the TA.XTplus 100C Stable Micro Systems' Texture Analyser with Multiple Pea Testing Rig (HDP/MPT). Measurements taken included: peak forces at puncture for (1) upper and (2) bottom skins with force over/time measured as area (3 and 4) for Young's Modulus and (5) elasticity (slope). This poster shows the two key measurements, the slope and peak force 1, which have been used for calculating samples' 'hardness', a crucial parameter in consumer acceptance of frozen peas [10,11].

Additionally, 6 samples (3 f-type and 3 c-type) were tested through preference/acceptance (affective) tests with 140 untrained panellists, where overall likability and purchase intentions were recorded.

All f-type samples have been sourced from UK seed banks, grown in semi-controlled conditions, blanched, and blast frozen within 2 hours of harvest, as per the industry standards.

Samples were served/tested at room temperature, after defreezing.

The CLT (Central Location Test) took place at The Food Innovation Centre, University of West London in November 2023.

Standards followed: BS ISO 8586:2012 & BS ISO 8586:2014.

Results summary:

It seems that forgotten crops might possess interesting sensory characteristics that have yet to be explored, with the potential for facilitating a feasible diversification of the food systems with minor cultivars [12, 13].

Limitations and recommendations:

This study was based on a case study on peas, sensory characteristics of other species' varieties and landraces could present different outcomes. Future research should look into accessing other bottle-necks to the diversification of food systems with forgotten crops.

Conclusions:

Despite rich cultural and historical significance, forgotten crops and varieties may encounter many barriers to their reintroduction into the food systems. Although the performance in comparison to commercial crops is questionable, some varieties could hold unique sensory characteristics worthy of further investigation as could be revival facilitating. Forgotten crops are interesting reservoirs for new gastronomic concepts and when used cleverly, can act as vehicles for the transformation of the food systems.

Results from affective tests: There are significant differences in consumer preference and acceptability of the individual specimens and between the two groups. In summary, c-type peas seem to have performed better over the f-type peas. Some f-type peas performed well, showed interesting characteristics and could be the subject to further tests.

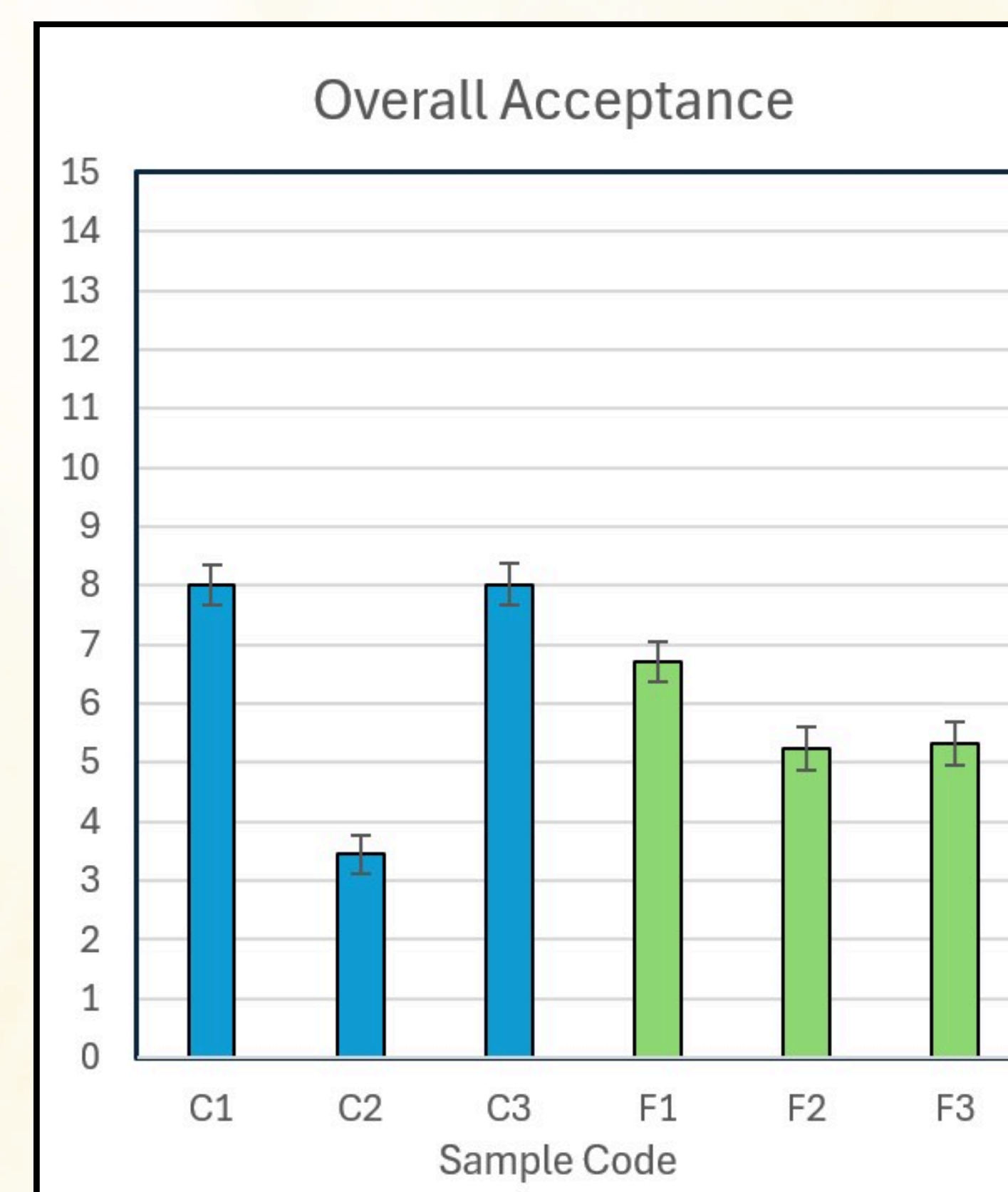


Figure 1: Bar chart showing the mean scores for overall sample acceptance, measured using uncoded line scale (length of 15cm) with two anchor labels.

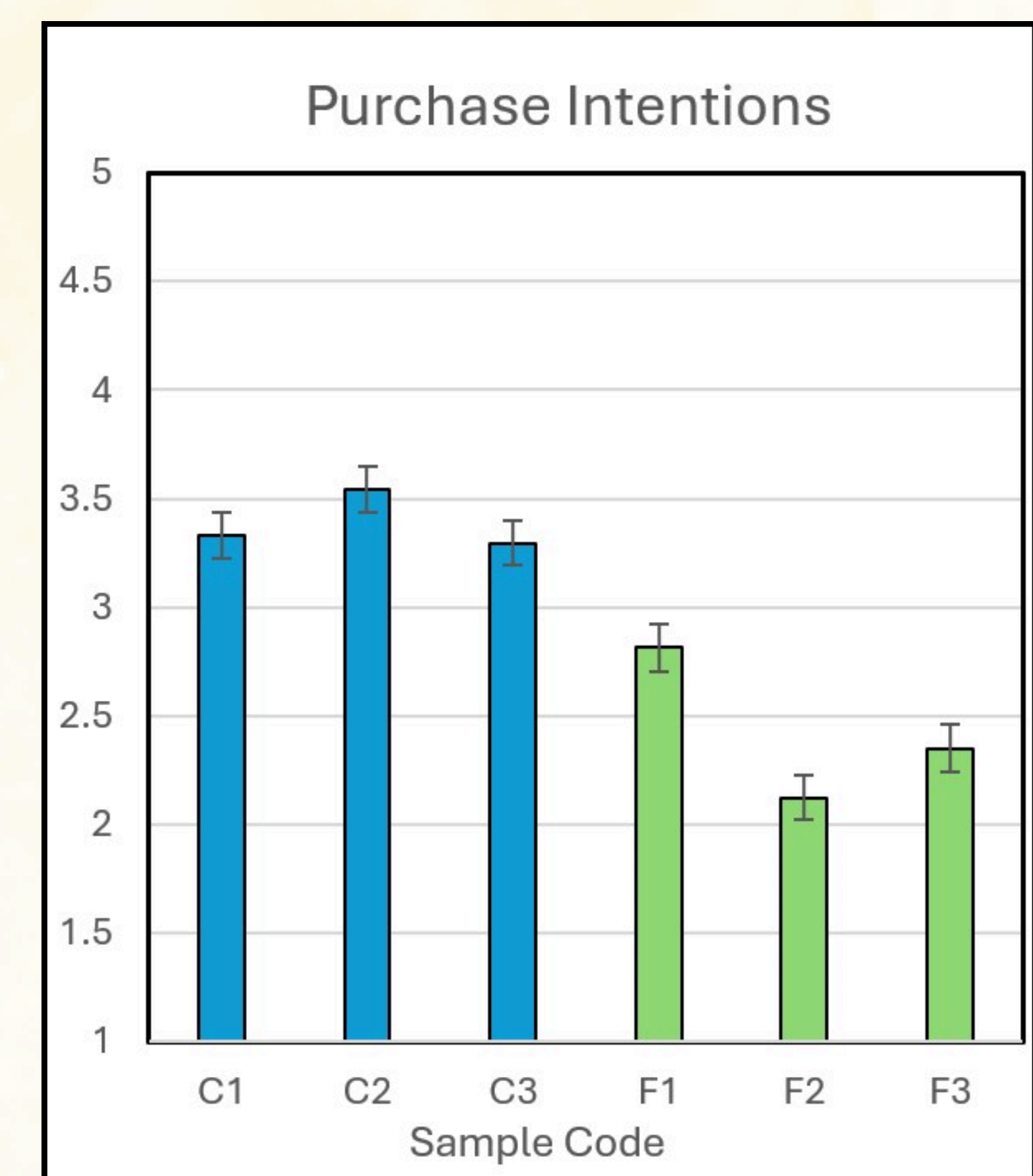


Figure 2: Bar chart showing the mean scores for overall purchase intentions, measured on a scale from 1 to 5.

Results from texture analysis: There are significant hardness differences between the f-type and c-type peas. The latter seem to exaggerate higher hardness, a characteristic most preferable amongst consumers of frozen peas.

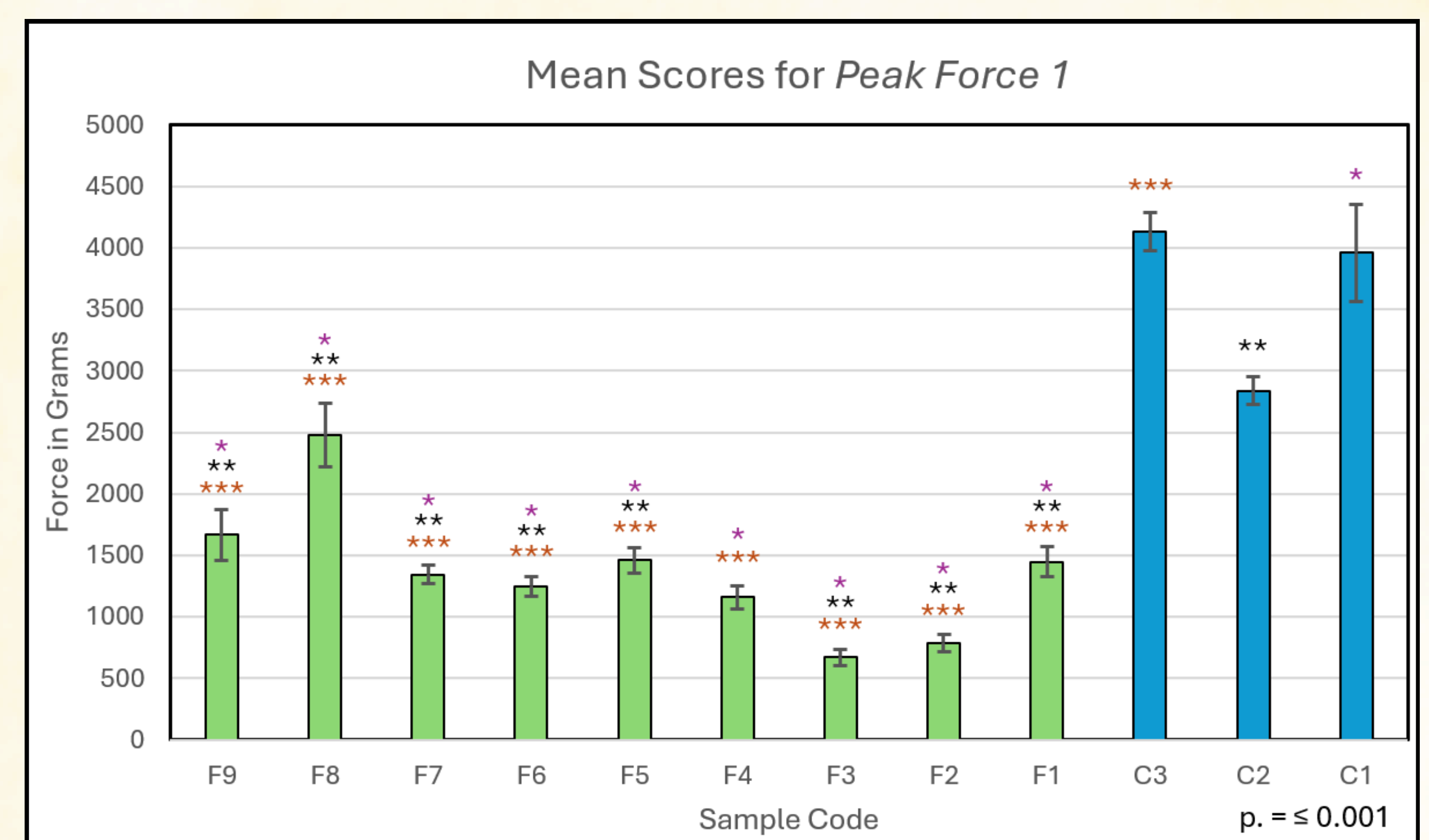


Figure 3: Bar chart representing the mean scores for Peak Force 1 – force in grams required to puncture the upper pea skin.

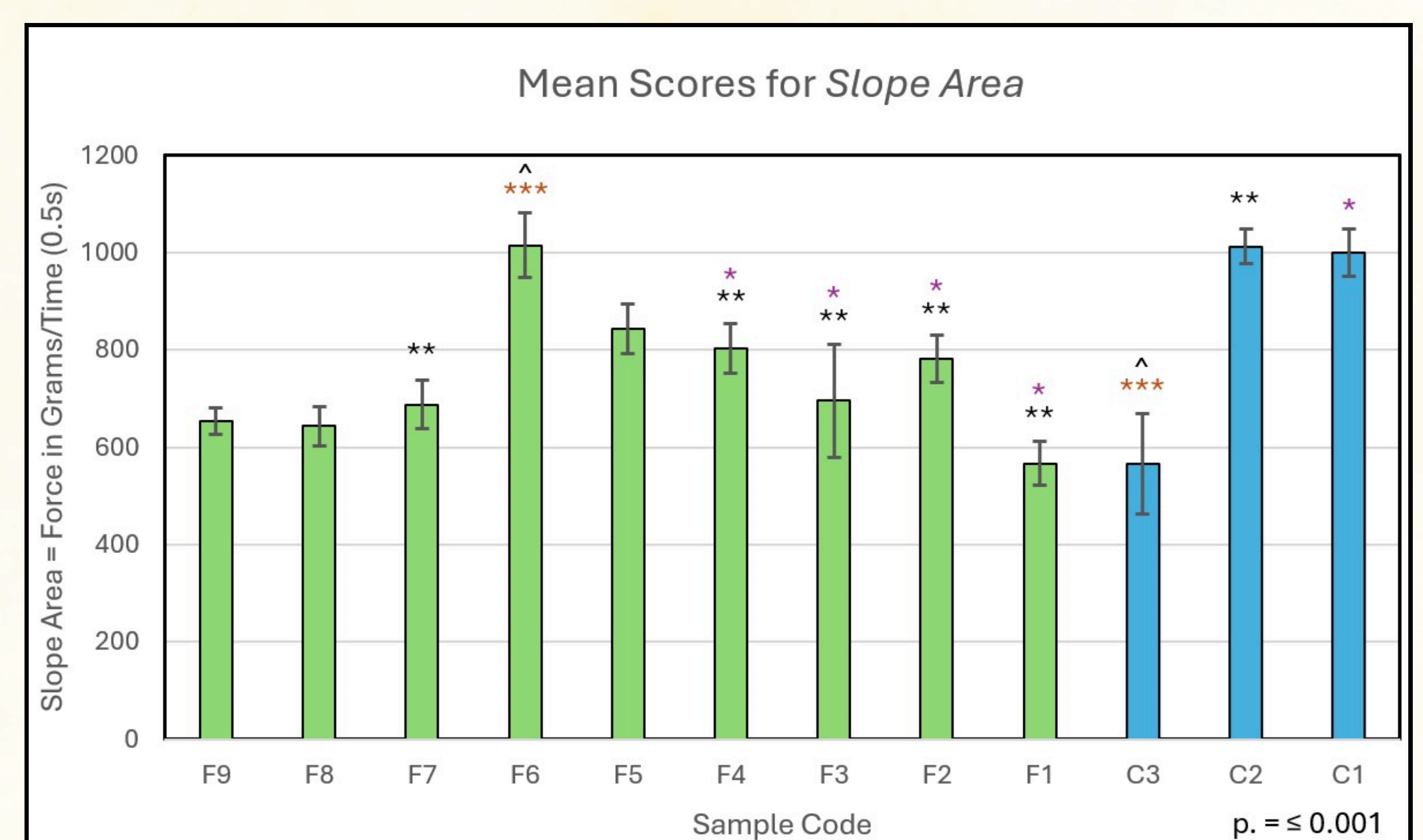


Figure 4: Bar chart representing the mean scores for Slope Area – force in grams over time (0.5s) showing the initial sample hardness during the first chew.