

Improving Mushroom Quality by Reducing Bruising Damage

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What is Mushroom Quality?

- White colour
- Firm texture
- Uniformity of colour, size and shape
- Good flavour
- definition from numerous consumer surveys

How can quality be improved?

It can't!

For high quality mushrooms, quality can only be lost!

During:

- Growth
- Harvest
- Post-harvest

Influenced by:

- Environment, Agronomy & Diseases
- Rough handling & bruising
- Post-harvest environment
 - Cooling
 - Packaging
 - Transport





Improving Mushroom Quality by Reducing Bruising damage

One of the main factors down-grading quality is bruising damage:

Bruising takes place during picking, handling and during transport

BUT susceptibility to bruising is influenced by how the mushrooms are grown

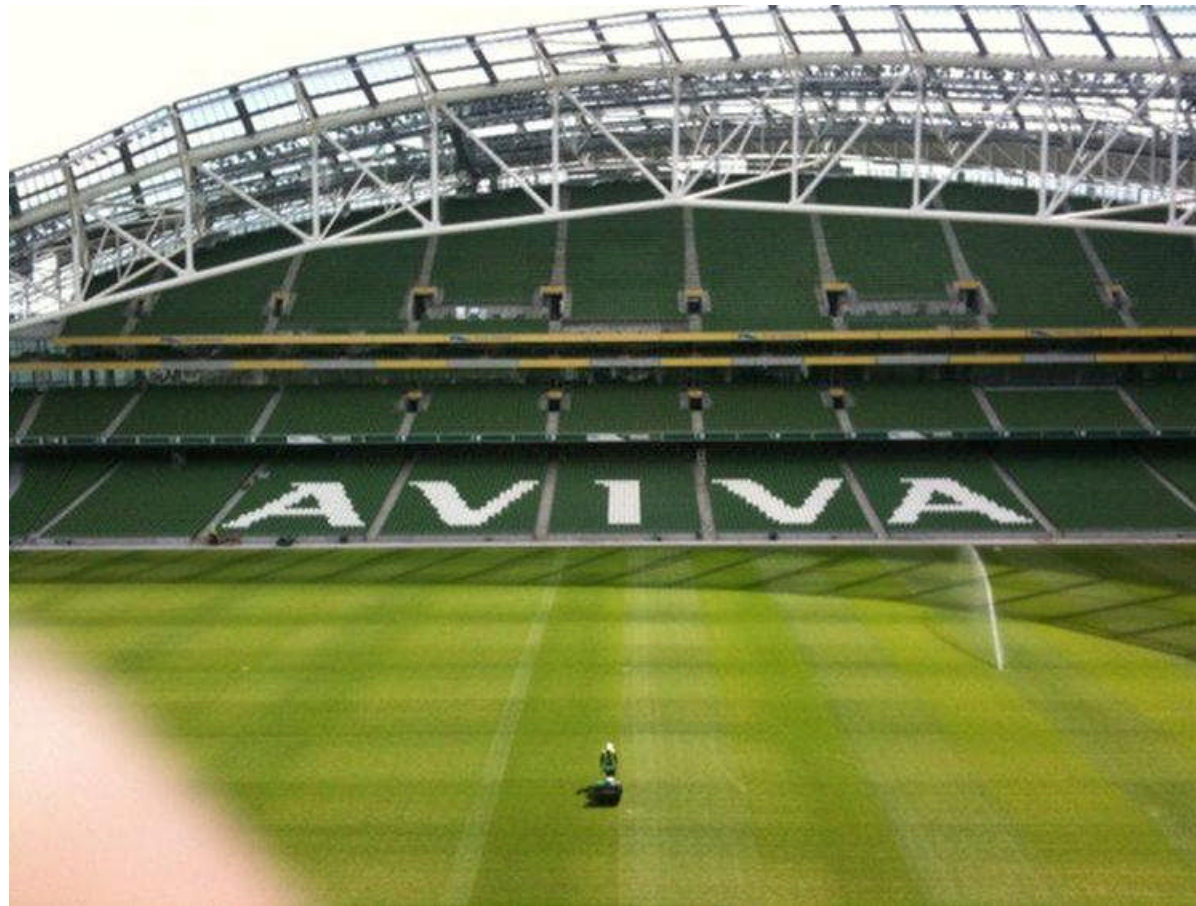
- Environment and agronomy

To understand how mushrooms bruise so easily we need to look at mushrooms as a
“structure”

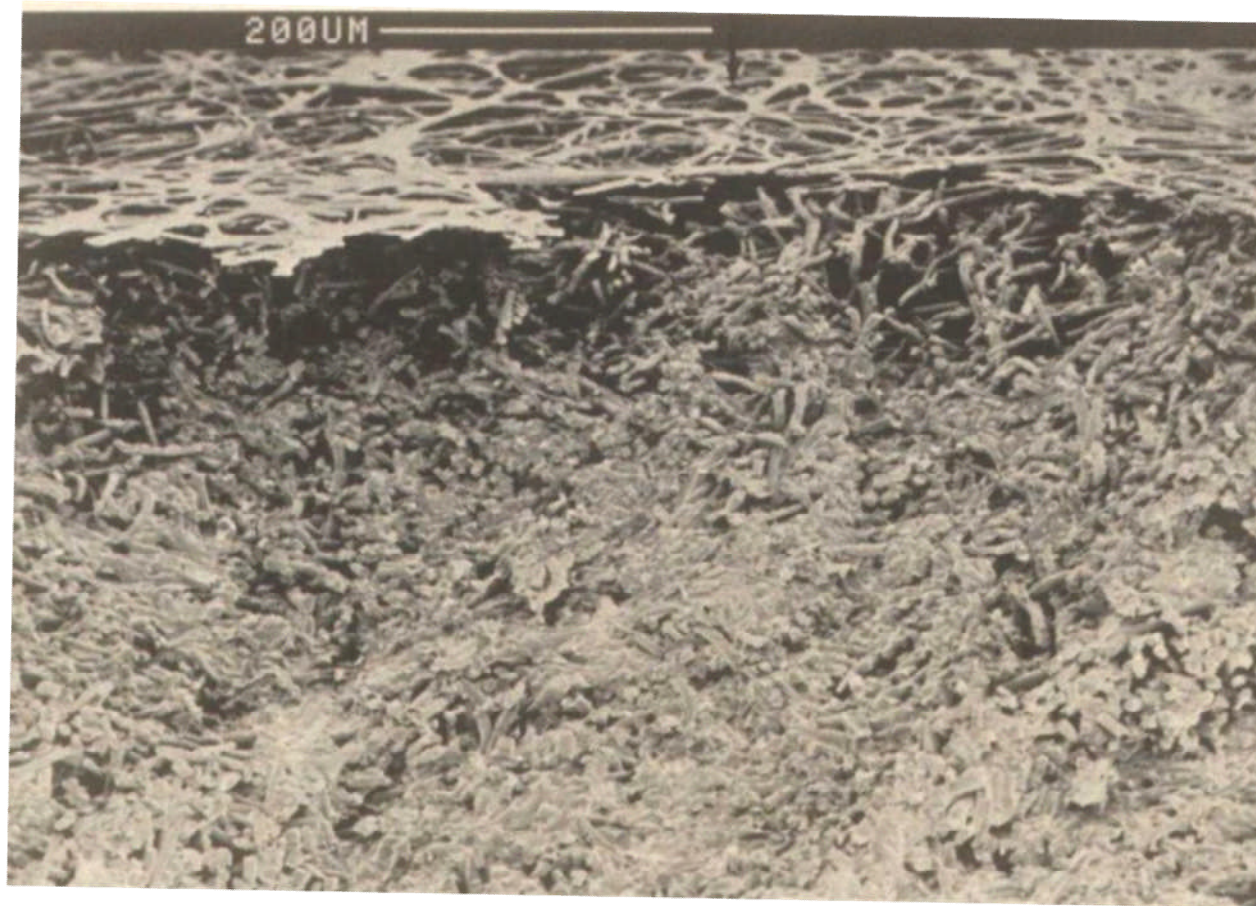


Lansdowne Road- Aviva Stadium

The structure explains how forces are received and distributed to keep the structure intact



Mushroom structure determined by cellular packing

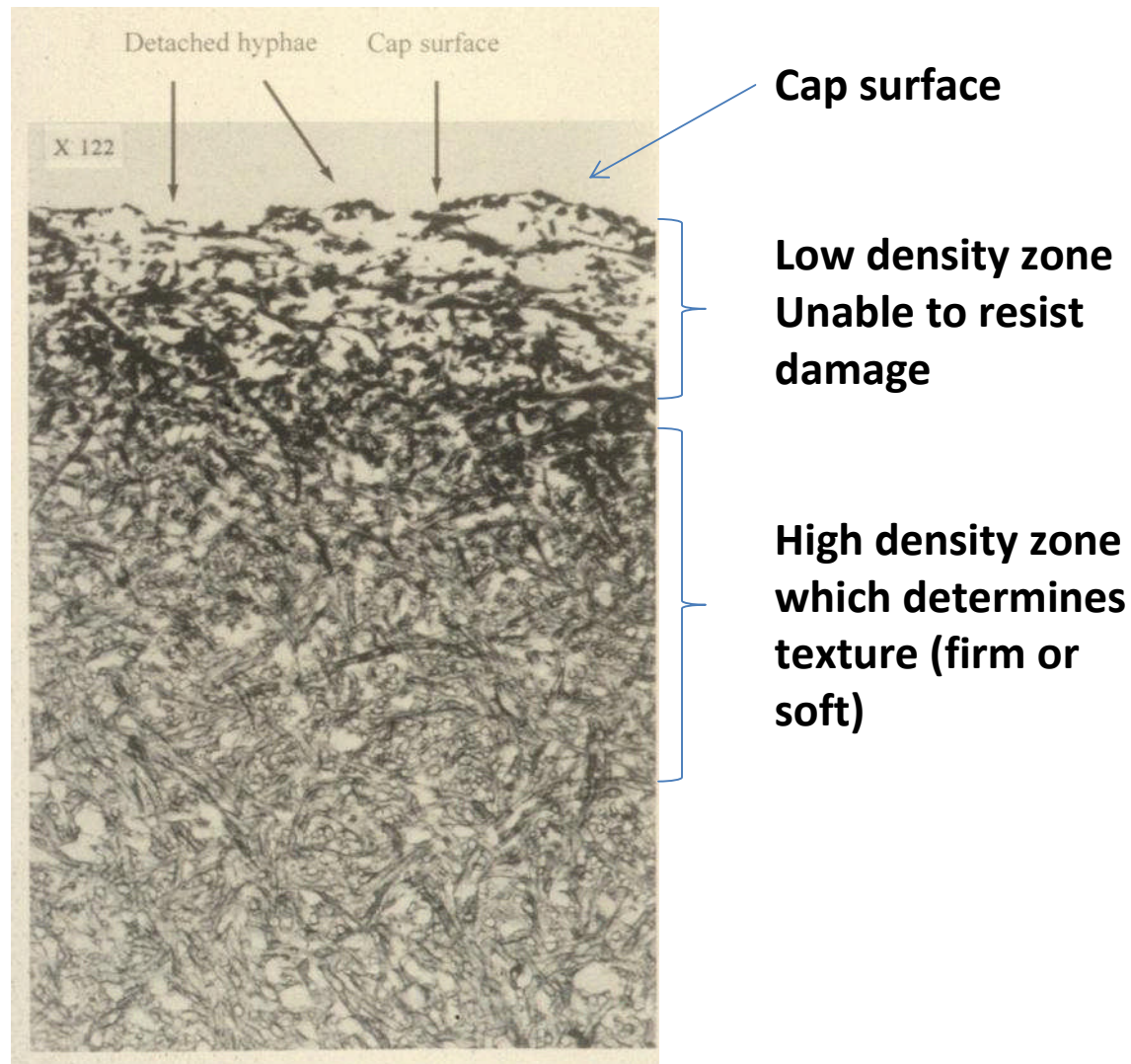


Cap surface

**Low density zone
Unable to resist
damage**

**High density zone
which determines
texture (firm or
soft)**

Mushrooms are easily bruised because the low density structure at the cap surface is unable to resist the damaging impact forces

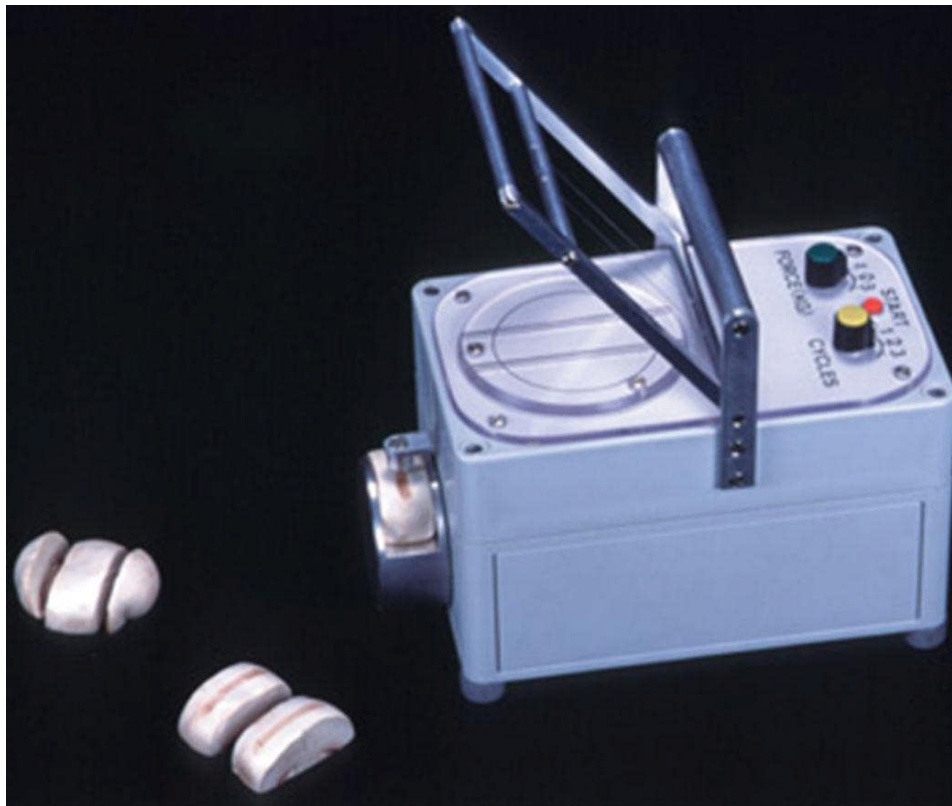


ENVIRONMENTAL FACTORS INFLUENCING BRUISING

Low density zone is where bruising takes place

But how do we find out how to reduce bruising?

“Bruisometer” designed to give a controlled amount of bruising



Environmental and Agronomic Factors shown to affect susceptibility to Bruising

- Casing wetness
- Humidity in growing room
- Calcium chloride irrigation
- Casing depth
- Casing composition
- Compost type
- Compost depth

Effect of Casing Wetness on mushroom bruisability

Casing water on bruise colour:

(the lower the number means more **brown colour** in bruise OR higher number represents whiter colour)

	WETNESS of CASING				
	Dry		Medium		Wet
Flush 1	82.32		82.20	<<	83.65
Flush 2	81.89		82.23		82.03
Flush 3	82.95	>>	81.57	>>	80.45

Effect of humidity on Mushroom Bruisability

Humidity on bruise colour:

(the lower the number means more **brown colour** in bruise OR higher number represents whiter colour)

	Relative Humidity		
	Low (85%)		High (92%)
Flush 1	82.33	<	82.85
Flush 2	80.76	<<	83.28
Flush 3	81.61		82.03

Effect of calcium chloride irrigation on Mushroom Bruisability

Calcium chloride irrigation (CaCl_2) on bruise colour:

(the lower the number means more **brown colour** in bruise OR higher number represents whiter colour)

	Irrigation treatment			
	Water irrigation		0.4 % CaCl_2	0.5 % CaCl_2
Flush 2	80.99	<<	83.86	83.36
Flush 3	83.93	<<	86.88	87.32

Environmental and Agronomic Factors affecting:-

Bruisability

Casing wetness	***
Humidity	***
Calcium chloride irrigation	***
Casing depth	**
Casing composition	*
Compost type	*
Compost depth	-
CO ₂ level	nm
Flush	***
Strain	***

Conclusions:

- Mushroom bruising occurs during picking and transport
BUT
- The degree of bruising is regulated by the growing environment
- Main factors affecting how much a mushroom bruises:
 - **Casing water (first flush wet, third flush dry)**
 - **Humidity (avoid low humidity)**
 - **Calcium chloride in water (> 0.4 %)**
- Growers should consider these factors if and when bruising becomes a problem.
- The impact of these factors will vary from farm to farm therefore cannot offer exact recommendations to suit all farms.

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HDC (UK) for funding a series of projects to develop bruisometer and examine effects of agronomy/environment on bruising

