



Department of
Primary Industries

Horticulture
Innovation
Australia



Olive Oil Smoke Point

Jamie Ayton and Kerrie Graham

Wagga Wagga Agriculture Institute

Wagga Wagga NSW

Introduction

- Smoke point
- Frying oils
- Types of frying
- What to believe?
- Analytical methods/ Instruments
- Research
- Outcomes
- Summary

What is smoke point?

Definition

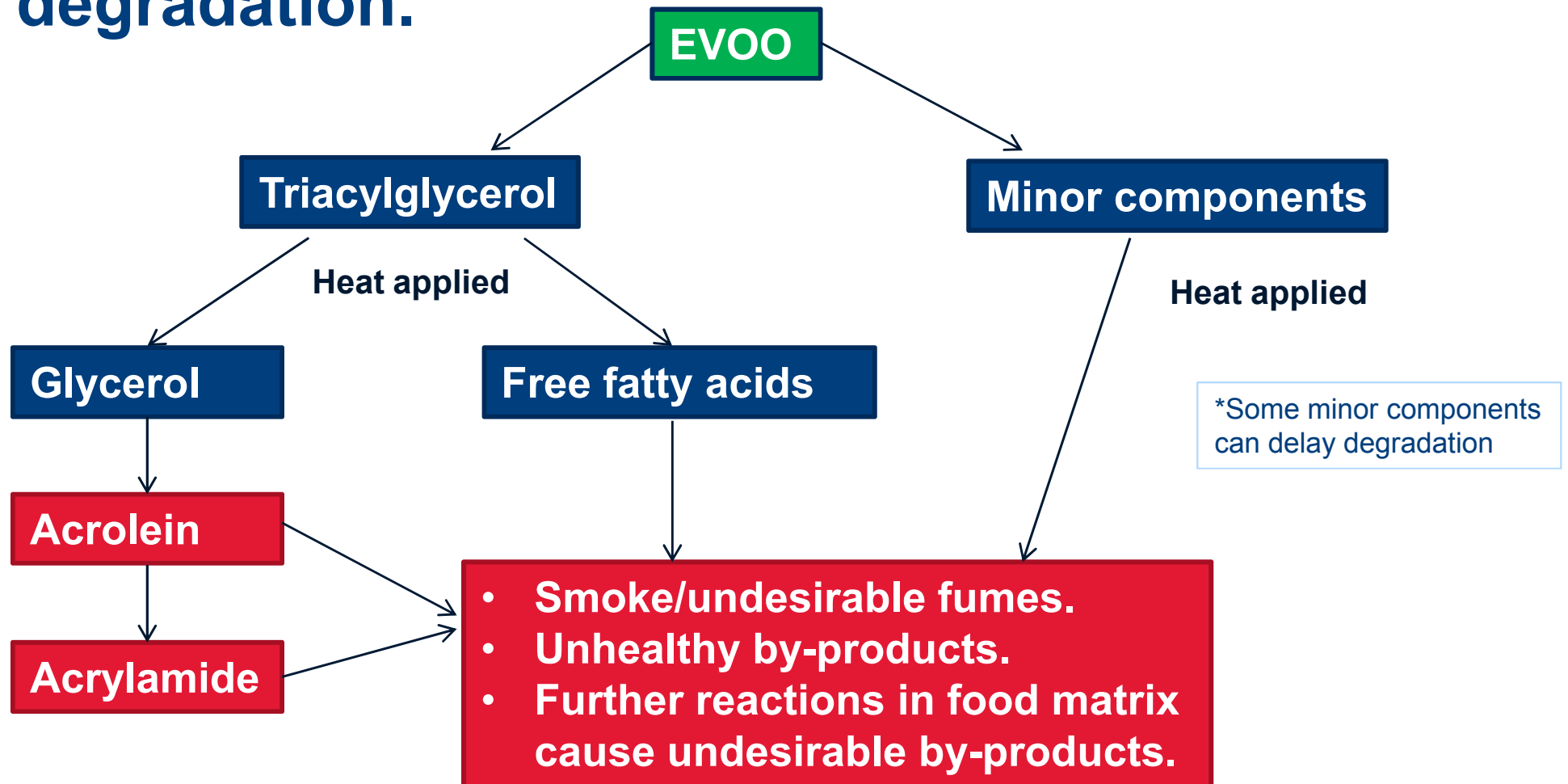
- the temperature at which volatile products in edible oils are sufficiently evolved to become visible.

More simply

- the temperature at which an oil or fat produces a continuous wisp of smoke under controlled conditions.

Why is smoke point important?

- Important because smoke indicates **Thermal degradation**.



Other considerations when frying

- **Accelerated oxidation**
 - Undesirable by-products
 - Sensory defects
 - Oil
 - Food cooked in oil
- **Continued heating**
 - Flash point – ignition temperature
 - Fire point – continuous combustion



Frying oils

- When frying, users need to consider
 - Type of frying
 - Costs
 - Availability
 - Neutral taste
 - Neutral colour
 - Oil composition

Types of frying

- Industrial



Types of frying

- Food service



Types of frying

- Domestic



Cost

- Important factor in determining which oil to use
 - Depending on market, location, type of oil and other variables, EVOO is 5 to 10 times more expensive than other commonly used cooking oils.



Availability

- **2014/15 total edible oil production - 175 million tonnes**
 - Palm
 - Soybean
 - Canola
 - Sunflower
 - Cotton
 - Olive oil

- **2014/15 total olive oil production – 2.3 million tonnes**
 - Not all classified as EVOO

Taste and colour – seed oils



- Neutral taste
- Uniform colour
- Undesirable products removed



Taste and colour - EVOO

- Mechanical extraction
- No refining
- Natural compounds
 - Polyphenols
 - Other antioxidants
 - Positive sensory characteristics
 - Range of colours depending on variables.



%FFA



- **Refining**

- Removes FFA
- Maximum recommended in deep frying oils
 - FFA - 0.05%
 - PV – 0.5 mEq/kg

- **EVOO**

- High quality FFA <0.4%
- High quality PV < 10m Eq/kg

EVOO characteristics

- Characteristics of EVOO which are positive attributes:
 - Mechanical extraction
 - No refining
 - Sensory characteristics
 - Colour

- These characteristics generally make EVOO oil **unsuitable** for:
 - Industrial frying
 - Food service deep frying
 - Domestic deep frying

EVOO and frying

- **However**

- EVOO is used for shallow frying, sautéing and stir frys in food service and domestic situations.
- When we speak about frying using EVOO, this is the type of frying we are talking about.

Why tell you all of this?

- Most scientific research
 - **Continuous systems/deep fryers**
 - How many days?
 - What are the changes in oil over time?
 - How much absorption?
 - What are the chemical markers for changing oil?
 - **Seed oils used for in most research for reasons previously mentioned**
 - Cost
 - Availability
 - Uniformity of taste and colour
 - Low %FFA

What to believe?

- Mostly anecdotal with no references
- Questionable motivation
- Most mention **smoke point** as the main issue



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Why olive oil should be kept out of the frying pan

With scientists advising against cooking with olive oil - it is claimed to produce toxic chemicals when heated - what should you use instead?

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The healthy-food blogger Ella Woodward shares her Instagram gallery

Repaseed: the British olive oil? Photo: GETTY

By Lydia Bell

Negative opinions

“Olive oil smoke point 160°C”

What to believe?

- Mostly anecdotal with no references
- Questionable motivation
- Most mention **smoke point not being an issue**

Myth Buster: Olive Oil is One of the Safest Cooking

299 15.2K 136 135 99 11k
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Just as the myths saying eggs are unhealthy and that we should avoid them are proven false, so too is the myth that olive oil should not be used for cooking.

Cooking with olive oil: some like it hot

May 15, 2015

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Sarah Berry

Life & Style reporter

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Liquid gold: Searching for the good oil.

It's called liquid gold, but can olive oil, like the precious metal, handle the heat?

A long-standing myth is that you shouldn't cook with olive oil.

"Olive oil is very good for you but some olives have a very low smoke point, and produce small amounts of carcinogens when heated," nutritionist Dr Glenys Jones told [The Telegraph London](#) recently, suggesting we should only use olive oil for salads and not cook with it.

Positive opinions

“Olive oil smoke point 220°C”

HIA OL15000 - Smoke Point in olive oil

- Proposal to determine smoke point for olive oil
 - **Project requirements**
 - Measure smoke point in Australian EVOO and VOO
 - Measure other determinants (%FFA, FAP)
 - Develop an analytical test to quickly determine smoke point using scientifically validated data.

Smoke point

- 200-300 EVOO and VOO samples from all growing regions.
- Smoke point measured using ASTM method D92-12b Cleveland open cup method.

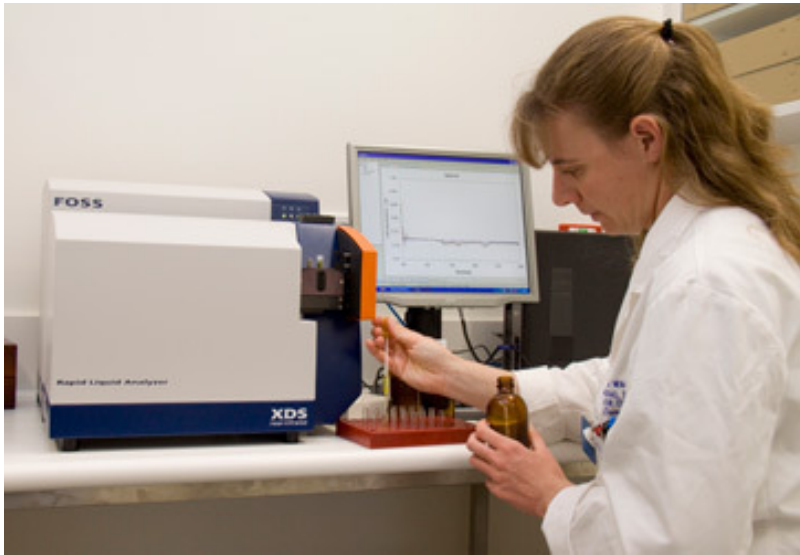


- %FFA measured using ISO 660
- FAP measured using ISO 5509 and ISO 5508

*ASTM – American Society for testing and materials

NIR analysis

- Two different NIRs
 - FOSS XDS – NIR
 - Bruker MPA – FT-NIR
- Simultaneous evaluation of calibrations on each NIR
- Choose instrument with most robust calibration statistics.



FOSS XDS



Bruker MPA

Outcomes from project

- **NIR calibration for smoke point**
 - Made available to olive industry through Oil Testing Service Wagga Wagga
- **Report detailing the smoke point and composition of a range of Australian VOO and EVOO**
- **A fact sheet to deliver outcomes to users**
 - Culinary professionals
 - Consumers
 - Cookware manufacturers

Summary

- Different types of frying – need to be clear on what we are talking about and where EVOO is being used.
- Smoke point – lots of anecdotal evidence, need scientific data.
- NIR smoke point calibration – accurate, low cost, quick.
- Once the evidence is clear, we can talk about EVOO and frying with confidence.

Acknowledgements

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- Horticulture Innovation Australia
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