THE EVOLUTION OF FIRE TRAITS IN PLANTS, PLANT INVASIVES AND WILDFIRE CHALLENGES

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Geological History of fire
Clonal habit

- Fire
- Resprouting
- Flowering
- Persist as short stems between fires
Populus tremula - Aspen
Fire traits: Protection; Stimulation

After Brown, Scott et al., 2012, Cretaceous Research
The origin of thick bark in pines (from He et al. 2011). Figure a) shows a phylogeny of conifers with red lines indicating evolutionary pathways for modern species with thick bark (>15mm). The scale at the bottom indicates time, estimated from molecular dating of the phylogenetic tree. This analysis points to a mid-Cretaceous (89 Ma) origin of conifers with thick bark adapted to surface fires. Serotiny, retention of seeds in closed cones with massed seed release after stand-replacing crown fires, also first evolved at this time. Figure from He et al., 2012, New Phytologist. (b) Pine (Pinus nigra) forest following surface fire, with trees, c.20 m tall, showing old branch shedding. © Cross-section of trunk of Pinus sp. showing bark, 45 mm thick at its maximum.
Climate Change and UK Wildfire

Overview

- Wildfire is a natural and essential part of some ecosystems.
- Recently, there has been a global surge of large wildfires and prolonged fire seasons, associated with a complex mix of climate change, changing land management practices and human behaviour.
- UK climate projections indicate that weather conducive to wildfire will increase.
- The 2017 UK Climate Change Risk Assessments and 2018 National Adaption Programmes identified wildfire as a cross-sector climate change risk.
- Responsibility for wildfire is fragmented in the UK, and generally focuses on extinguishing fires rather than prevention.
- Better wildfire prevention in the UK could be achieved through landscape management.
PYROPHYTIC VEGETATION TYPES:

Grasses: Any cured (dry) grass. Nonirrigated, annual grasses are typically more flammable than perennial grasses. Irrigated grasses are fire resistant.

Herbs: Any cured herb.

Ferns: Any dry or cured fern, particularly cured

Brush: Any brush with excessive deadwood. Any over-mature, dying or dead brush.

Trees: Any forest, stand or urban forest that is over-dense, under stress or over mature.
Flammability of UK Plants
Thursley, Surrey

October 2006

March 2012
Burning in itself is not an effective means of control of:

**Gorse.** Burning is of little benefit for long term control. Its effect is to bring about a break in seed dormancy resulting in the appearance of young seedlings as a carpet to re-invade the burned area.

**Bracken.** Burning is of no benefit. Burning of dead litter is unlikely to affect the buds below the surface.
Problem of Gorse as fire hazard on M3 near Windlesham

Note extreme flame height when gorse burns
Bracken. Burning is of no benefit. Burning of dead litter is unlikely to affect the buds below the surface.
Bracken has the potential to significantly alter tree–grass interactions in montane grasslands. Adie et al 2011 Plant Ecology

Bracken should not be treated by fire. Bracken spread will be stimulated by burning
Re-growth of fern and grass two weeks after Rushmoor fire, Surrey
June 1995

Re-growth of heather
March 2012
First, an intractable weed like *P. aquilinum* can be eradicated and a vegetation more suited for grazing can be achieved by the continuous application of some treatments over many years. Here, success was achieved by cutting twice/thrice annually, or by a single asulam application followed by annual spot spraying of all emergent fronds for 8 years.

MILLIGAN et al 2015 Weed Research
Japanese Knotweed – a warning
1. Collect every little piece you cut of the plant, every stem, every leaf, all of it.

2. Dig out the crown out and all the thick rhizomes as much as you can.

3. Leave all the material out to dry on a waterproof surface making sure any material will not be washed off by rain or blown on by wind.

4. You must burn all the waste on the land the weed came from, you MUST NOT move it onto any other land to burn, you will face large fines and in some cases a possible prison sentence if you’re found transporting Japanese Knotweed.

5. Anything left from the fire other than ash you must burn again. A Japanese Knotweed crown is known to survive multiple fires.

6. Return to the site monthly in the growing season for the next 5 years ready to treat with weed killer.
FIRE DANGER

VERY HIGH

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ANDREW C. SCOTT

BURNING PLANET
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Available now from Oxford University Press

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FIRE
A Very Short Introduction

Available May 2020 from Oxford University Press