

# Mulches for weed control in field vegetables in the UK

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 774340

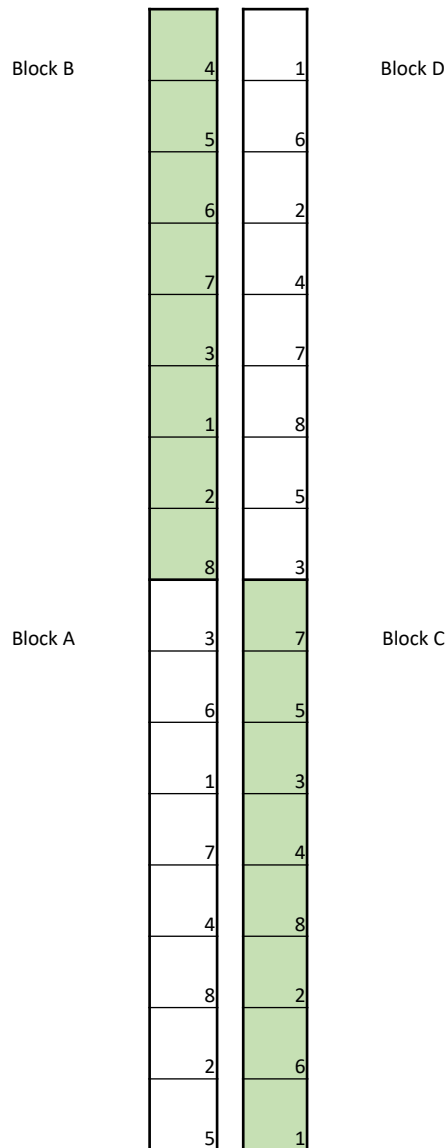
# Aims of the trials:

To evaluate a range of biodegradable and non-biodegradable mulches with respect to:

- Ability to suppress weeds
- Effect on crop yield and quality
- Rate of degradation in the field
- Release of plasticisers and microplastics into the soil
- Effect on soil health
- The environmental impact of each treatment (life cycle analysis)



# Film mulch trials



- Trials laid out in using four randomised blocks
- Each plot 1 bed wide by 4m long
- Onions and cabbages were used as test crops
- The treatments were very similar in each year but some changes had to be made

2019 trials	2020 trials
Weeded control	Weeded control
Unweeded control	Unweeded control
Woven polypropylene	Woven polypropylene
Polythene	Polythene
Commercial biodegradable 1	Commercial paper
Commercial biodegradable 2	Commercial biodegradable 2
CUT 1	CUT 1
CUT 2	CUT 3



Before planting soil was sampled at three depths. These initial samples will be compared with samples taken after harvest and assessed for compounds such as phthalates which may have leached into the soil.



After collecting the initial soil samples the 6 mulch treatments were applied to the plots. The ends of the materials were laid in trenches and the sides tucked under the soil using hand tools in a way that simulated the action of the tractor implement.





In both 2019 and 2020 the crops were planted by hand using a wooden template to simulate commercial spacing of either onions or cabbages

### **ONION TRIALS:**

Sets (cv 'Red Baron')

Planted in May

Harvested in August



### **CABBAGE TRIALS:**

Transplants (cv 'Impala')

Planted in June

Harvested in November



# Results – Onion growth



By early June significant amounts of annual weeds had emerged in the unweeded controls and beneath the white mulches (CUT 1 and CUT 2)

By late June the white mulches had begun to split. By July only scraps around the edges remained, especially in CUT 2 (2019)

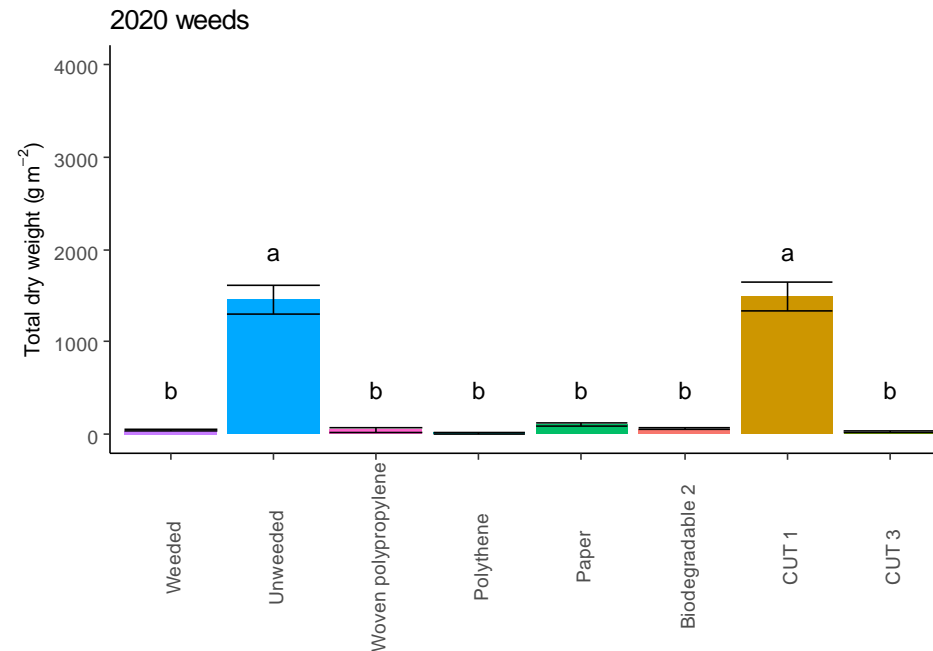
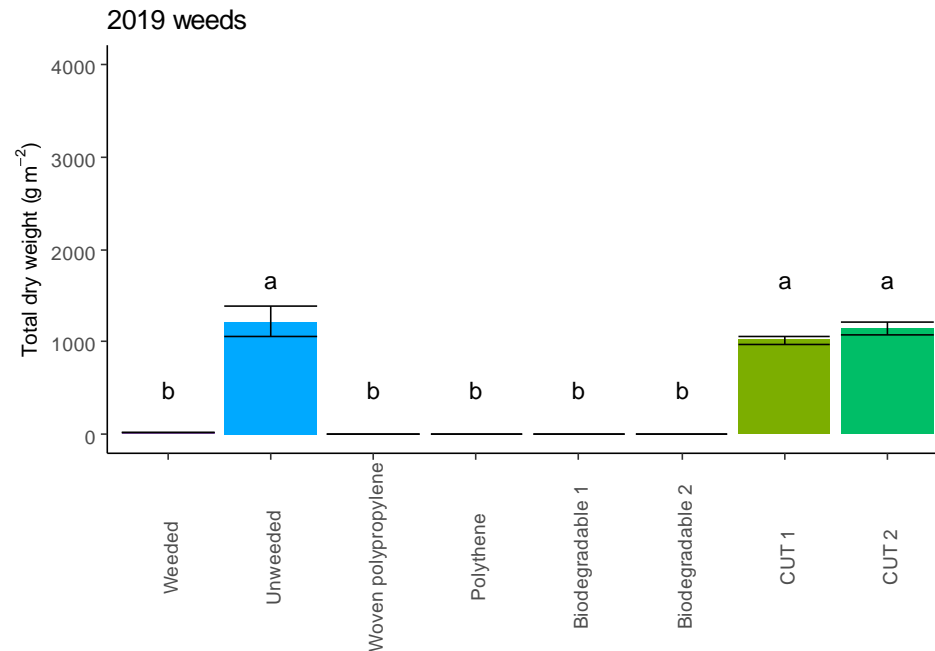




All the black mulches effectively suppressed the weeds until harvest

After harvest the polythene film began to disintegrate whilst the black biodegradable mulches just came loose from the soil along their edges

# Results – weed biomass

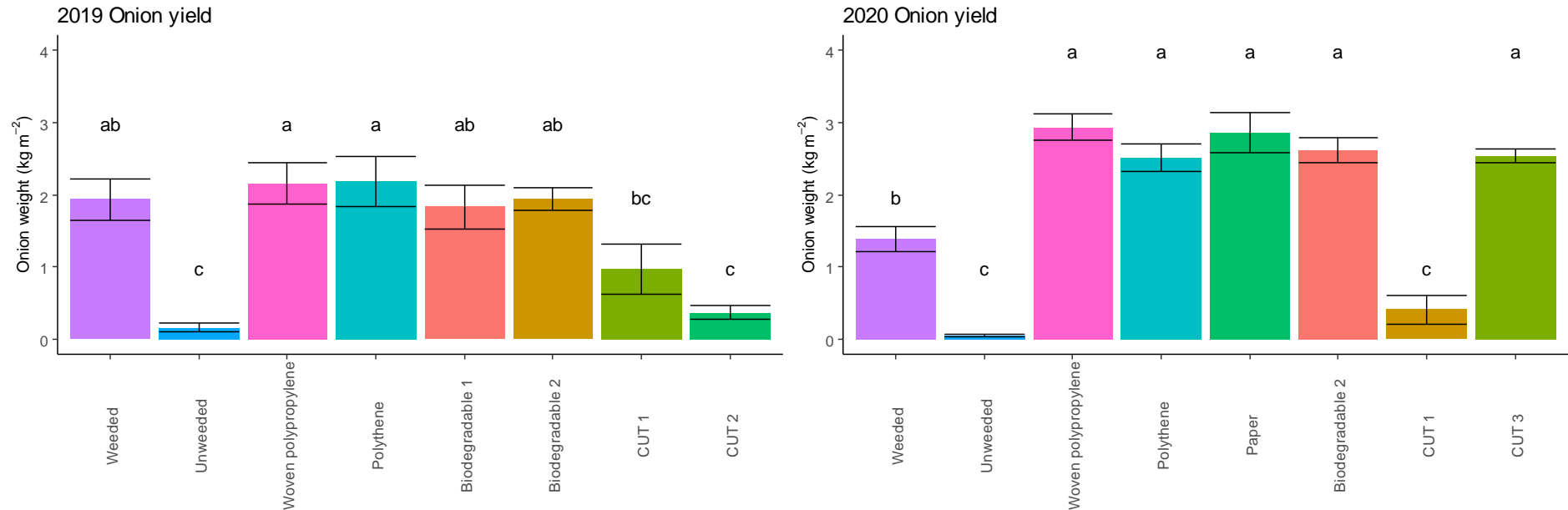


The unweeded plots and the plots with white mulch (CUT 1 and CUT 2) all became very weedy, inhibiting onion yield

In 2020 the new innovative black mulch from Poland, CUT 3, had a similar effectiveness to the commercial black mulches



# Results – onion yield



The pattern of the onion yield was generally closely related to the weed biomass

In 2019 CUT 1, although it later disintegrated, allowing the weeds through, it was able to keep them suppressed in the early stages of establishment to have some beneficial effect on yield

In 2020 the unweeded control did not yield as well as any of the black mulched plots - possibly because the mulches retained water in the soil

# Results - cabbages



Overall weed pressure was less than in the onion trial

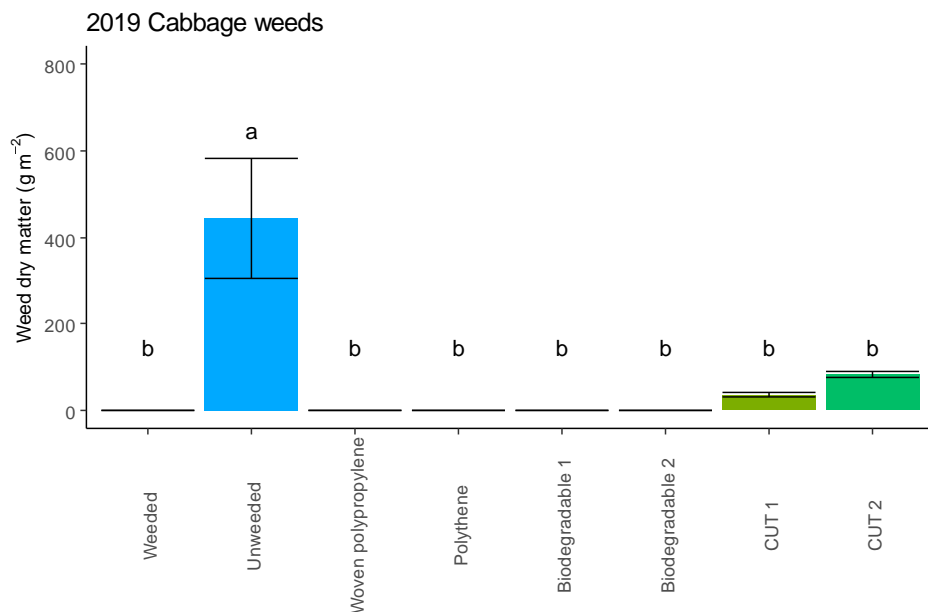
The white mulches degraded less rapidly and were largely effective until the cabbages became large enough to compete



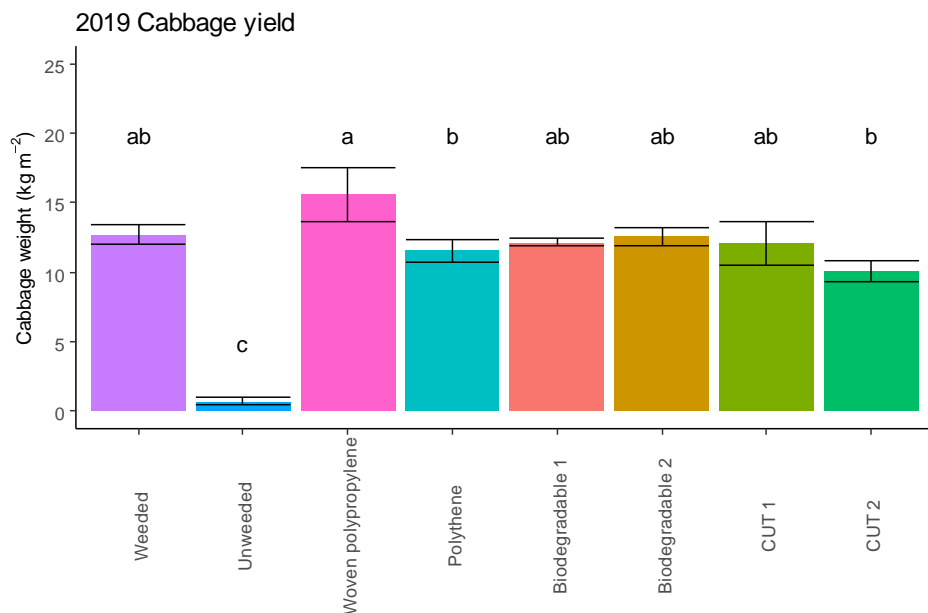




# Weeds and cabbage yield (2019)



In this trial there was less degradation of the white mulches (CUT 1 and CUT 2) as the crop itself was more competitive. This was reflected in the weed biomass.



Only the unweeded control had a negligible yield

All the other treatments produced a good marketable crop



# Loose mulch trial 2020

Six 'on-farm' materials were evaluated for their ability to suppress weeds



**Poplar chips**  
(provided by ATB)



**Extruded poplar**  
(provided by ATB)



**Willow chips**



**Green waste compost**



**Grass clippings**



**Hay**



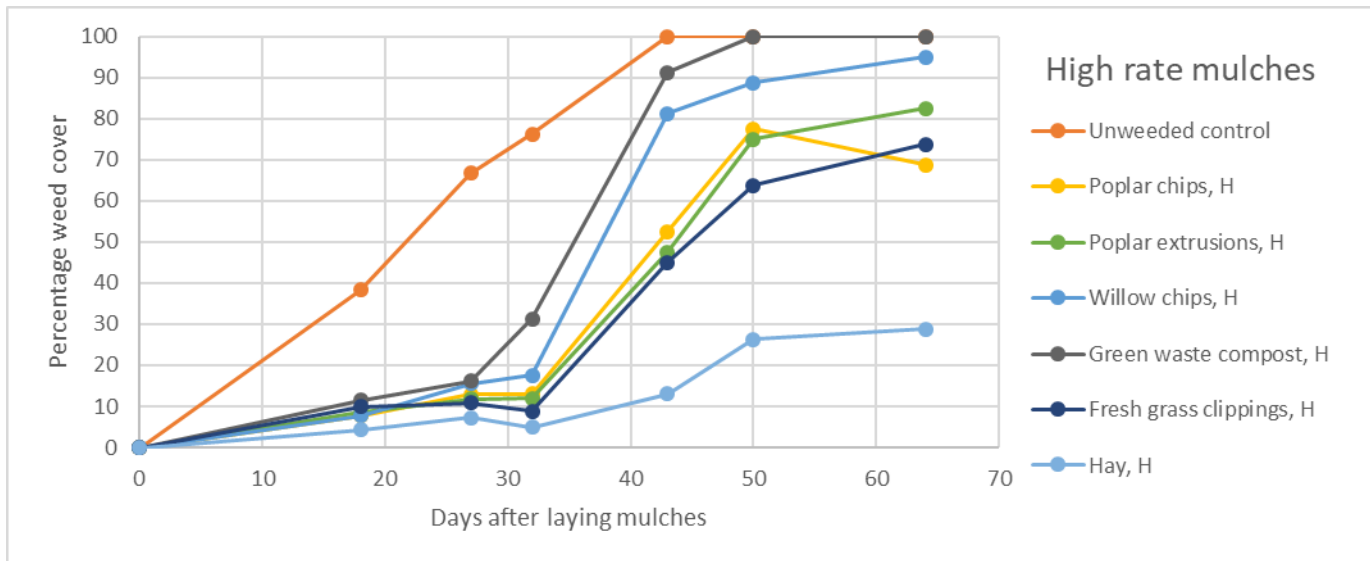
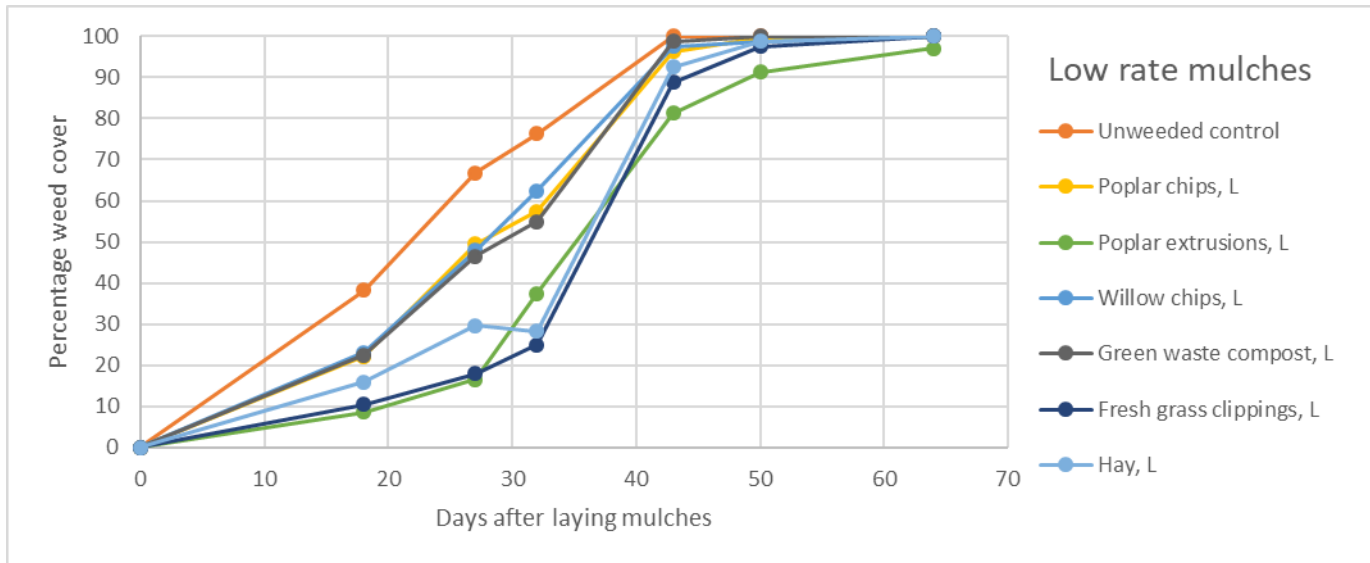
Two application rates (15 and 30 L m<sup>-2</sup>)  
14 treatments with four replications  
Plot size 2.4 m<sup>2</sup> (no crops)  
Applications were made on 9/7/20



Treatment	Application rate
Weeded control	
Unweeded control	
Poplar chips	High
Poplar chips	Low
Extruded poplar	High
Extruded poplar	Low
Willow chips	High
Willow chips	Low
Green waste compost	High
Green waste compost	Low
Grass clippings	High
Grass clippings	Low
Hay	High
Hay	Low



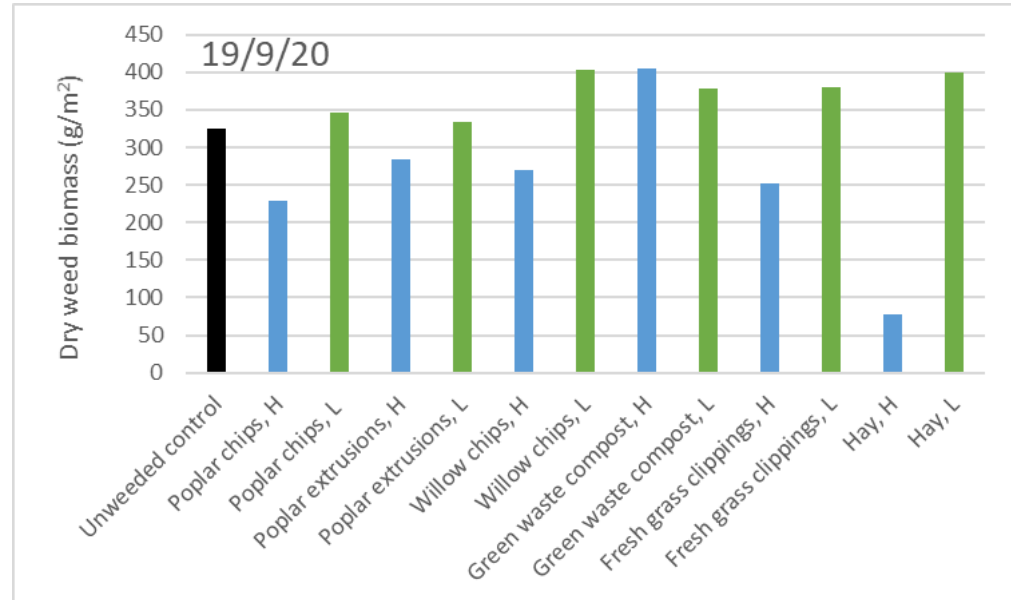
# Weed cover



# Weed biomass



- The dominant weed overall was gallant soldier (*Galinsoga parviflora*)
- After only a month none of the low rate mulches were effective
- The best mulch by far, two months after application, was the high rate hay mulch





# Interim conclusions

- All the black mulches effectively suppressed weeds whilst the crops were growing
- Even a mulch that broke down before the end of the growing season could be worthwhile, depending on the crop
- After harvest the polythene film mulch rapidly disintegrated whilst the woven polypropylene remained intact
- Loose mulches can offer an on-farm alternative to films but need to be applied at a high rate to be effective – this can have effects on nutrient dynamics

*Our laboratory work to assess soil contamination with plasticisers and microplastics has been delayed by Coronavirus*

*We have been working with **Innovative Farmers** to conduct additional trials under commercial conditions*