

# Organic mulches in vegetable crops

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**Rationale:** The influence of organic mulches has been studied thoroughly worldwide. In contrast, in Lithuania there is a lack of investigations on this topic. Especially in using organic remains for mulching under the changing climate conditions. Mulches affect crops, weeds and soil by different ways therefore investigations of different mulches in different crops are relevant.

**Methods:** Small plots field experiment was established in Zastaučiai village Mažeikiai distr. Lithuania. Treatments of the experiment – organic mulches: 1) without mulch; 2) peat mulch; 3) buckwheat husk mulch; 4) wheat straw mulch; 5) grass mulch. The soil of the experimental site is *Calc(ar)i-Endohypogleyic Luvisol* (LVg-n-w-cc). The agrochemical characteristics of the experiment soil at the beginning of experiment in 2018: pH – 7.3, content of available nutrients in the soil: P<sub>2</sub>O<sub>5</sub> – 119 mg kg<sup>-1</sup>, K<sub>2</sub>O – 213 mg kg<sup>-1</sup>. In 2018-2019 the effect of organic mulches was investigated and in 2020 the residual effect of mulches was investigated (all experimental plots not mulched). In 2018 *Beta vulgaris* var. *atrorubra* cultivar ‘Bordo Nr.237, in 2019 *Allium cepa* cultivar ‘Stuttgarter Riesen’ and in 2020 *Solanum tuberosum* cultivar ‘Adora’ were grown in experimental plots. Mulches were spread by hand in a 10 cm layer after sowing / planting of plants. No fertilizers and pesticides were used. Weeds were counted in each experimental plot in 4 squares of 0,1 m<sup>2</sup>. Crop yield was determined by weighing.

**The aim** was to investigate the effect of different organic remains used for mulching vegetable crops on vegetable yield and weed density.



Fig. 1 Field experiment in 2018



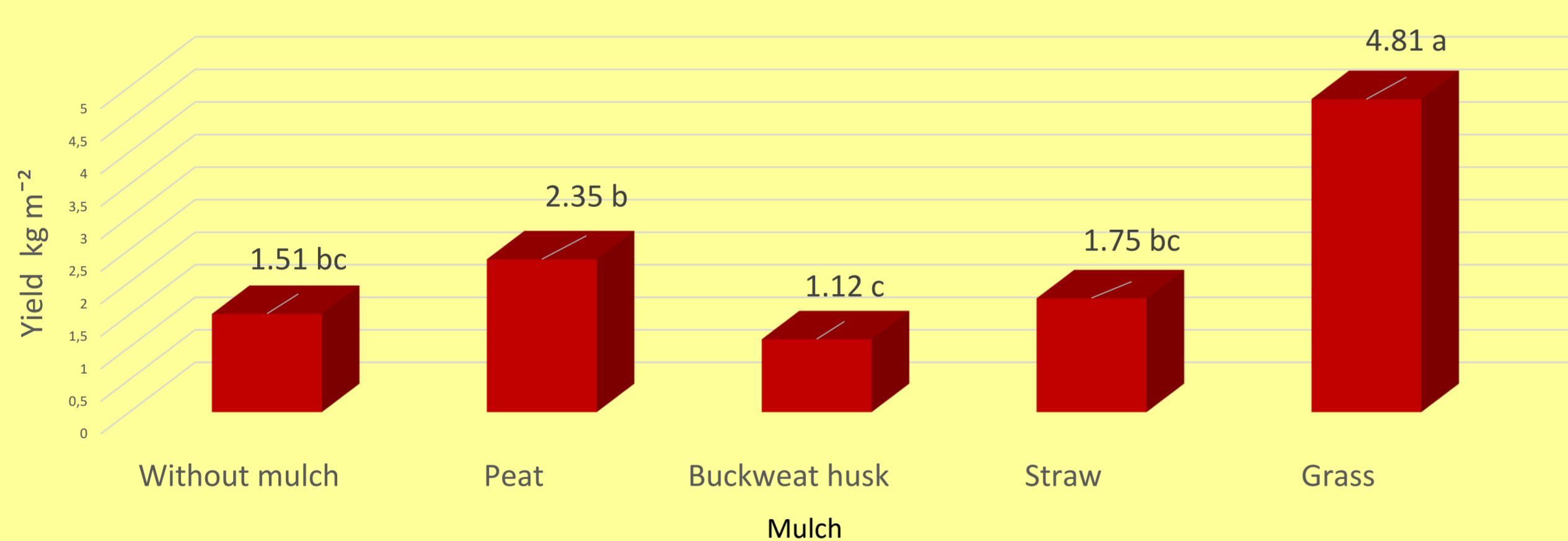
Fig. 2. Field experiment in 2018



Fig. 3. Field experiment in 2019

In 2018 the highest yield of *Beta vulgaris* var. *atrorubra* was investigated in grass mulched plots. It was 3.2 times higher than that in plots without mulch. The tendency of higher yield in plots mulched with peat and straw was observed. In plots with buckwheat husk mulch yield of beetroot was 1.3 times lower but not significantly. Similar results were obtained in 2019 when *Allium cepa* was grown. In 2019 organic mulches significantly affected the onion yield. The highest yield was investigated in plots mulched with grass mulch. It was 2.3 times higher compared to onion yield in unmulched plots. Peat and straw mulch significantly increased (by 1.5 times) onion yield. Onion yield was investigated to be significantly lower (by 1.6 times) in plots covered with buckwheat husk mulch compared to this in plots without mulch. It is interesting that while in 2020 organic remains were not used in plots for mulching the residual effect of mulches was still investigated. After statistical evaluation of data significant differences between potatoe yield grown in plots previously mulched with diferent organic remains were obtained. Due to these results we can see that significant effect of mulching with organic remains prolongs minimum one year after organic remains were used. We can hypothesize that this effect is due to various ways that mulch affects crops, weeds and soil properties. Mulch acts not only as a physical barrier and not only as the source of nutrients for microorganisms and crops, but they also affect plants due to their allelopathic properties. Buckwheat is known as a crop with strong allelopathic effect (Szwed at all., 2019; Iqbal at all., 2009).

The effect of organic mulches on weed density in crops was not equivalent. In beetroot crop all investigated organic mulches significantly decreased weed density. The effect of grass mulch on weed density was strongest, weed number in grass mulched plots was 3.1 times lower than that in plots without mulch. The buckwheat husk mulch effectively decreased weed density but also decreased the yield of vegetables. The effect of straw on weed density was the weakest. In 2019 a tendency of lower weed density in mulched plots was obtained but significantly decreased only by peat and straw mulches. Kosterna (2014) investigated the effect of different types of straw (rice, buckwheat, rye, rape). Soil mulching with straw resulted in greater aboveground plant biomass and higher physiological parameters compared with unmulched plots. Soil mulching, irrespective of the type of straw applied, contributed to slower soil warming compared to the control plot without mulch. There are many organic remains that can be used for mulching. It is very important to investigate the effect of organic remains if we want to use them for mulching vegetable fields. Some of them can be used in gardens when growing perennial plants but not in vegetable crops.



Note. The differences between the averages of treatments marked by not the same letter (a, b, c) are significant at 95 % probability level.

Fig. 4. The effect of organic mulches on beetroot yield

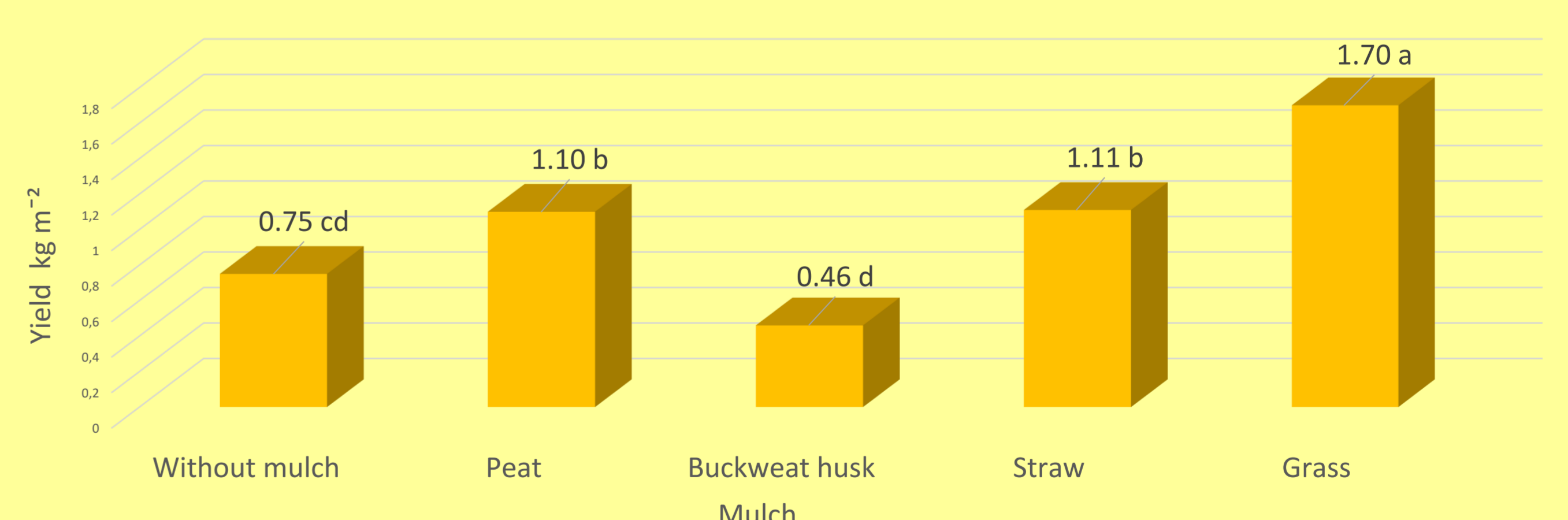


Fig. 5. The effect of organic mulches on onion yield

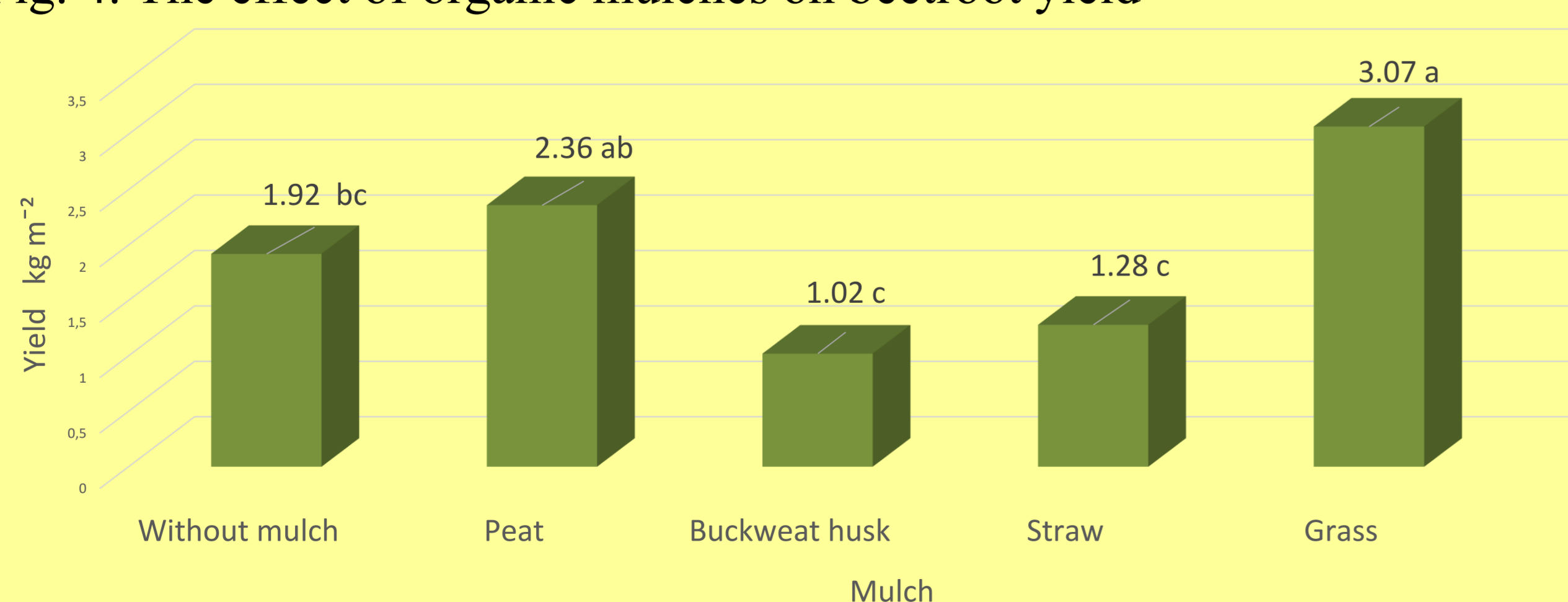


Fig. 6. The residual effect of organic mulches on potato yield

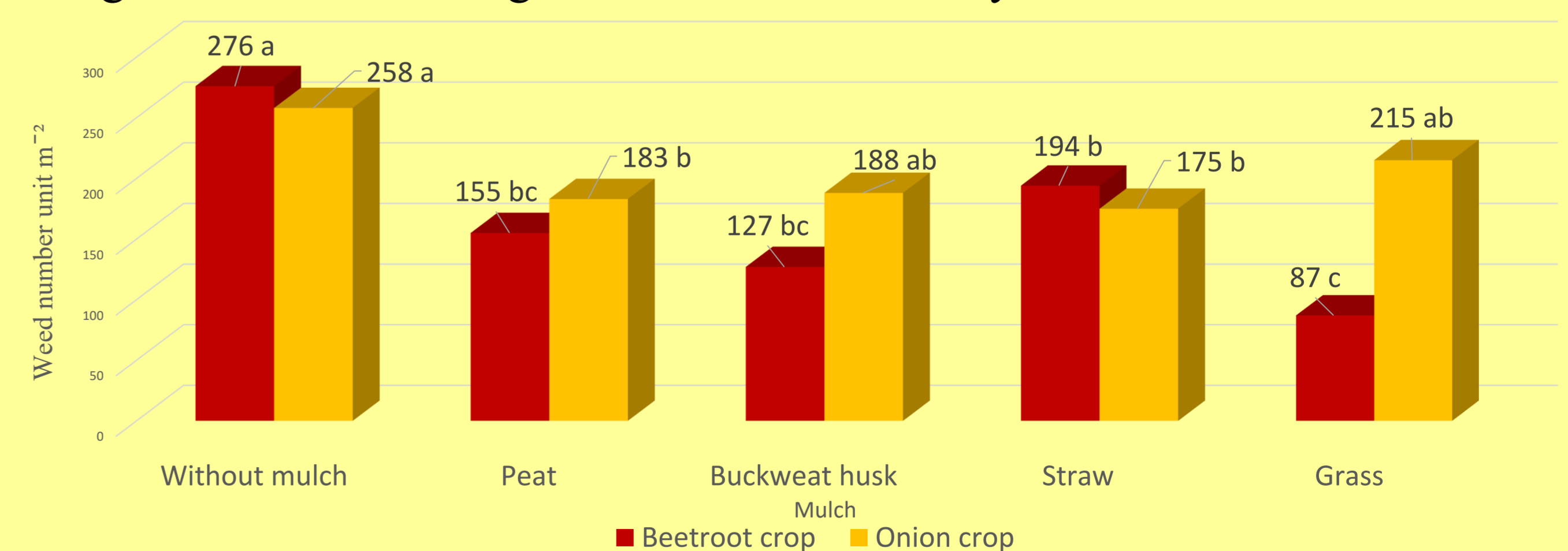


Fig. 7. Weed number in vegetable crops in 2018-2019

**Conclusions:** The effect of organic mulches on vegetable yield and weed density in crops was different. In 2018 organic mulches significantly affected the yield of *Beta vulgaris* var. *atrorubra*. The highest yield was investigated in plots mulched with grass mulch. In plots covered with buckwheat husk mulch lower beetroot yield tendency was investigated. The similar results were obtained in 2019 when *Allium cepa* was grown. The tendency of lower weed density in mulched plots was observed. Buckwheat husk mulch affected crops and weeds due to its allelopathic properties.