

# The influence of organic mulches on beetroot (*Beta vulgaris* L.) agrocenosis

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**Rationale:** People are becoming more aware of polluting less environment and choosing healthier, organic products for food.

The field experiment was carried out in 2019 on the Pranas Palubinskas Farm located in Paigiai Village, Kelmė District. Research aim – to determine the influence of different organic mulches on soil agrophysical properties (temperature, moisture), weed germination dynamics, and on the yield of beetroot.

**Methods:** In the experiment soil temperature and moisture were measured with a mobile device, weed germination was calculated every 15 days, and the yield of beet (*Beta vulgaris* L.) was weighed. Experiment treatments: Factor A – mulches: 1) without mulching; 2) straw mulch; 3) grass mulch; 4) sawdust mulch. Factor B – thickness of mulch layer: 1) 5 cm; 2) 10 cm.



Figure 1. The experiment fields of organic mulch

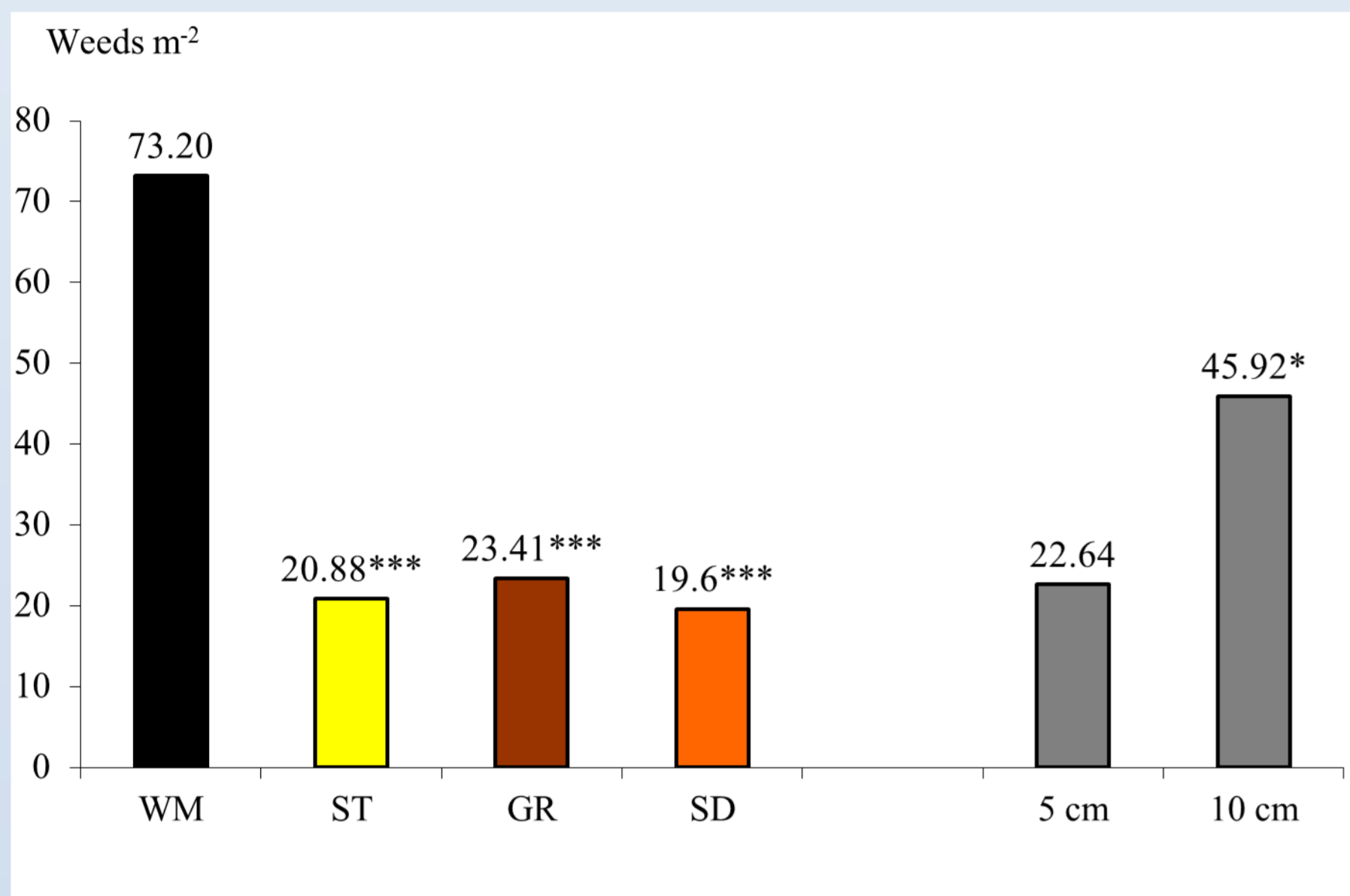


Figure 2. The influence of organic mulches and different thickness of mulch layer on germination of annual weeds. WM – without mulch, ST – straw, GR – grass, SD – sawdust. Significantly different: \*95% probability level, \*\*\*99.9% probability level.

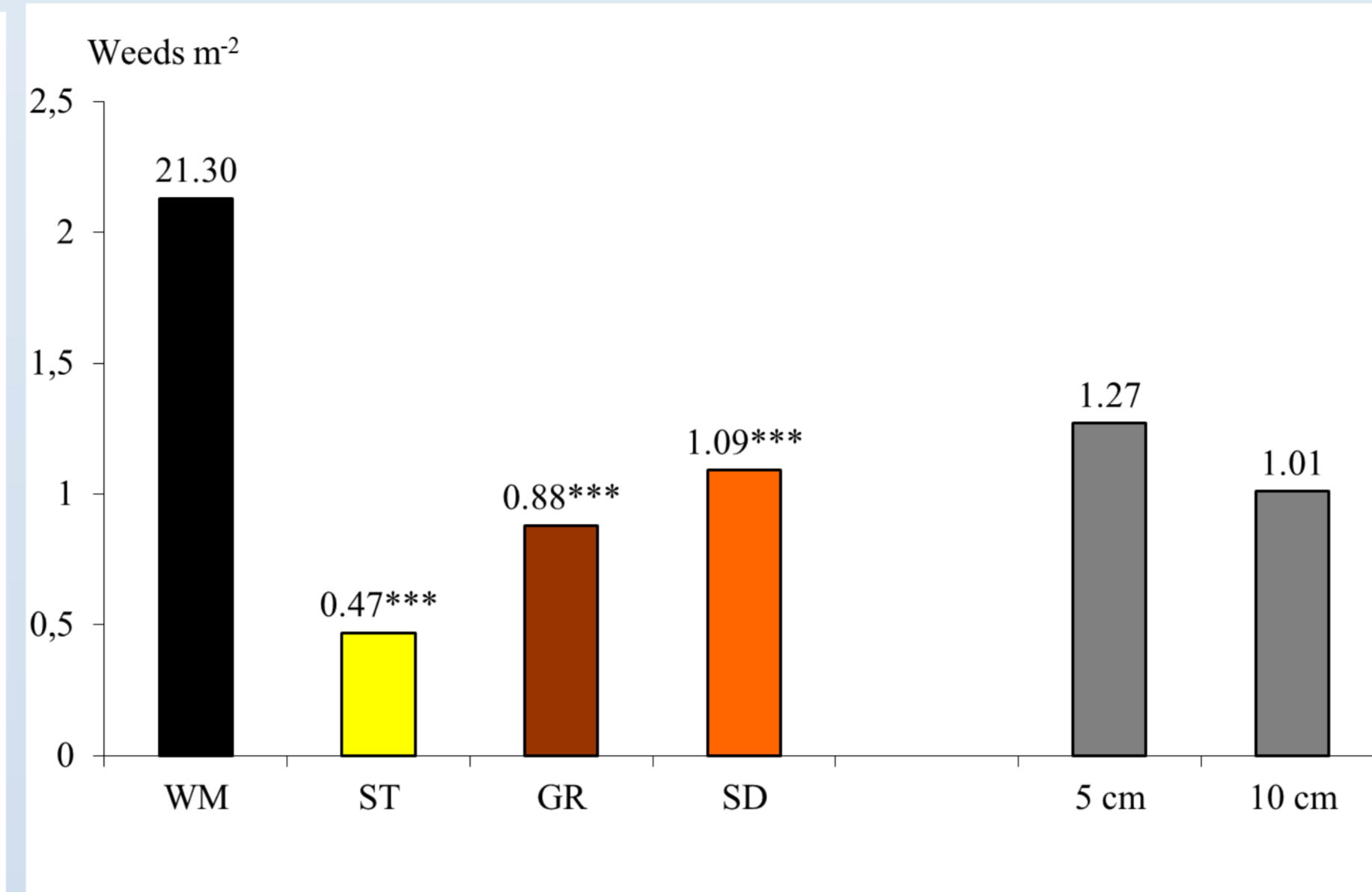


Figure 3. The influence of organic mulches and different thickness of mulch layer on germination of perennial weeds. WM – without mulch, ST – straw, GR – grass, SD – sawdust. Significantly different: \*\*\*99.9% probability level.

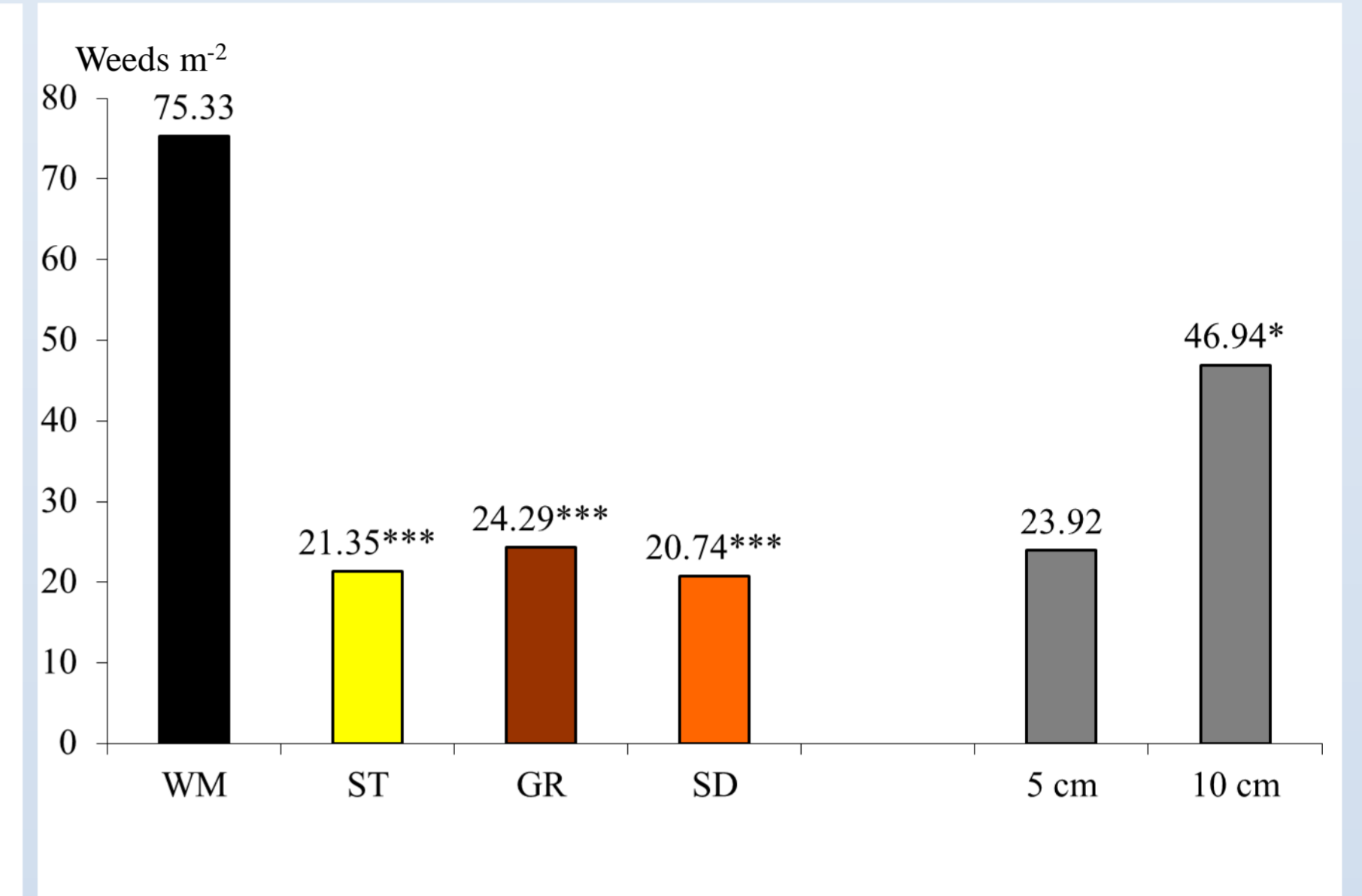


Figure 4. The influence of organic mulches and different thickness of mulch layer on germination total weeds. WM – without mulch, ST – straw, GR – grass, SD – sawdust. Significantly different: \*95% probability level, \*\*\*99.9% probability level.

**Results.** Covering the soil with organic mulch significantly reduced the germination of annual weeds from 3.1 to 3.7 times compared to without mulch fields (Fig. 2). Most perennial weeds (2.13 weeds m<sup>-2</sup>) were found in non-mulched fields (Figure 3). After covering the soil with organic mulch, weed germination changed significantly. Straw mulch reduced weed germination 3.5 times, sawdust germination 3.6 times, and grasses 3.1 times compared to the without mulch soil (Fig 4.).

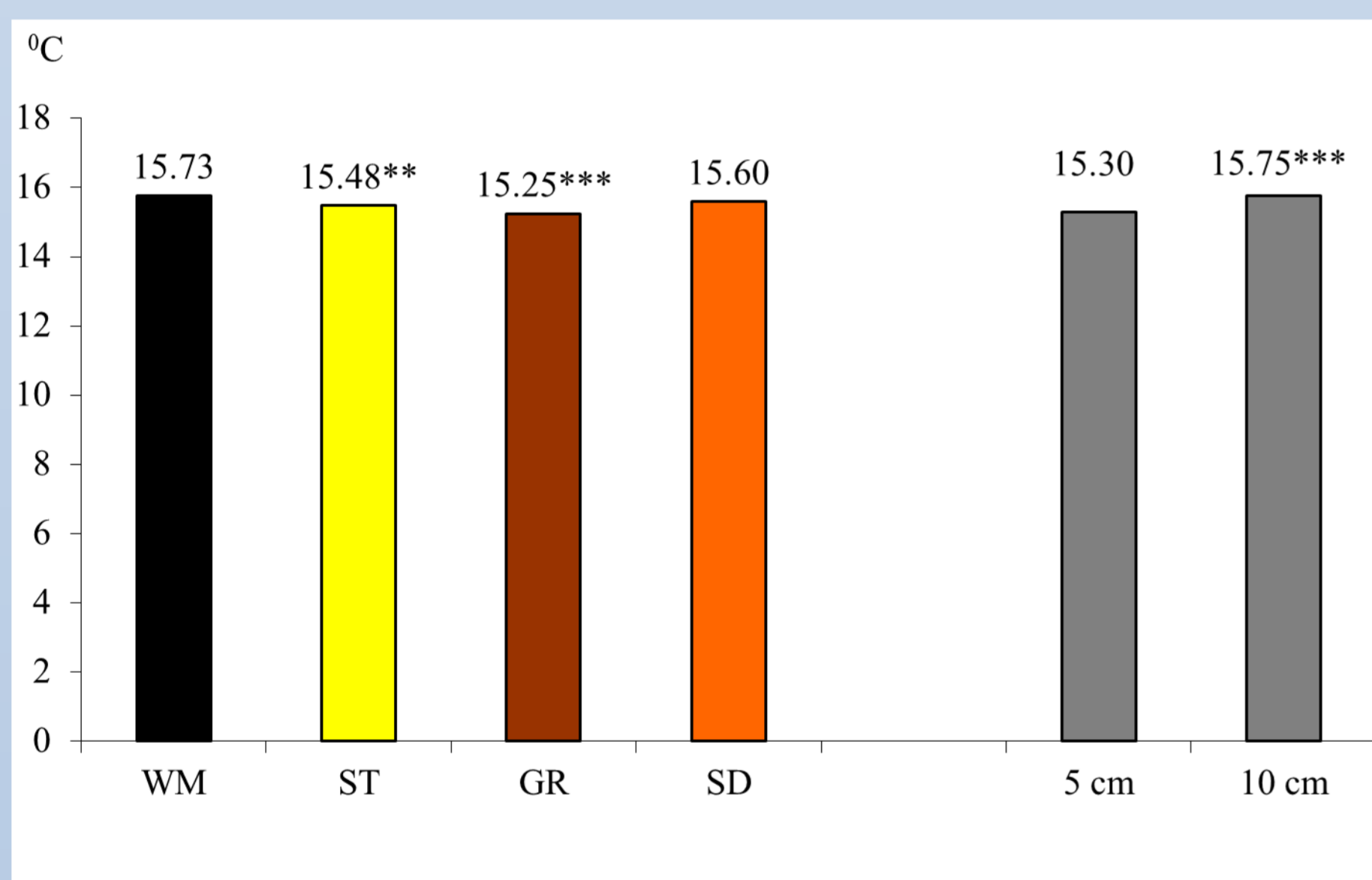


Figure 5. The influence of organic mulches and different thickness of mulch layer on the soil temperature (26.09.2019). WM – without mulch, ST – straw, GR – grass, SD – sawdust. Significantly different: \*\*99% probability level, \*\*\*99.9% probability level.

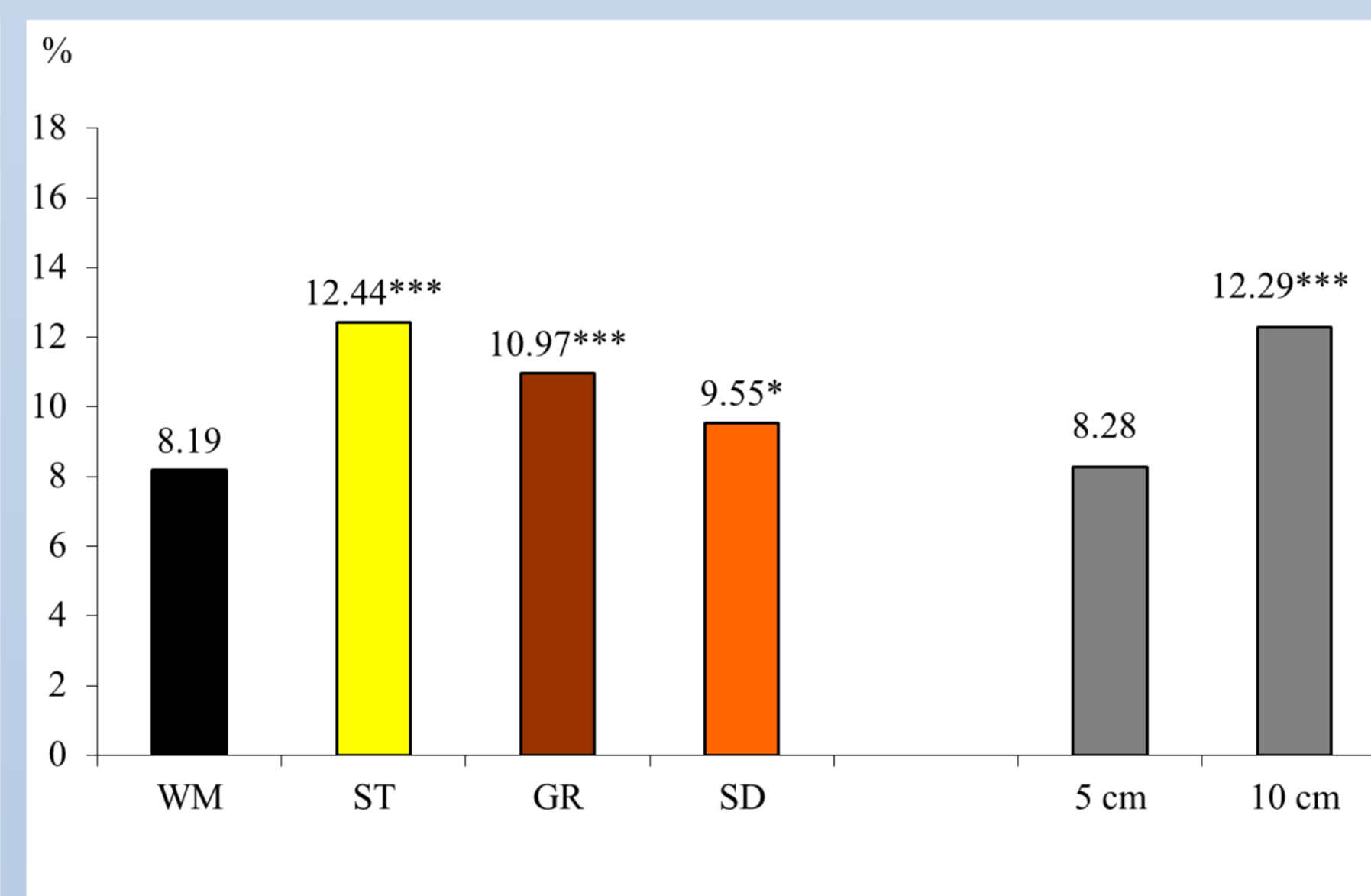


Figure 6. The influence of organic mulches and different thickness of mulch layer on the soil moisture (26.09.2019). WM – without mulch, ST – straw, GR – grass, SD – sawdust. Significantly different: \*95% probability level, \*\*\*99.9% probability level.

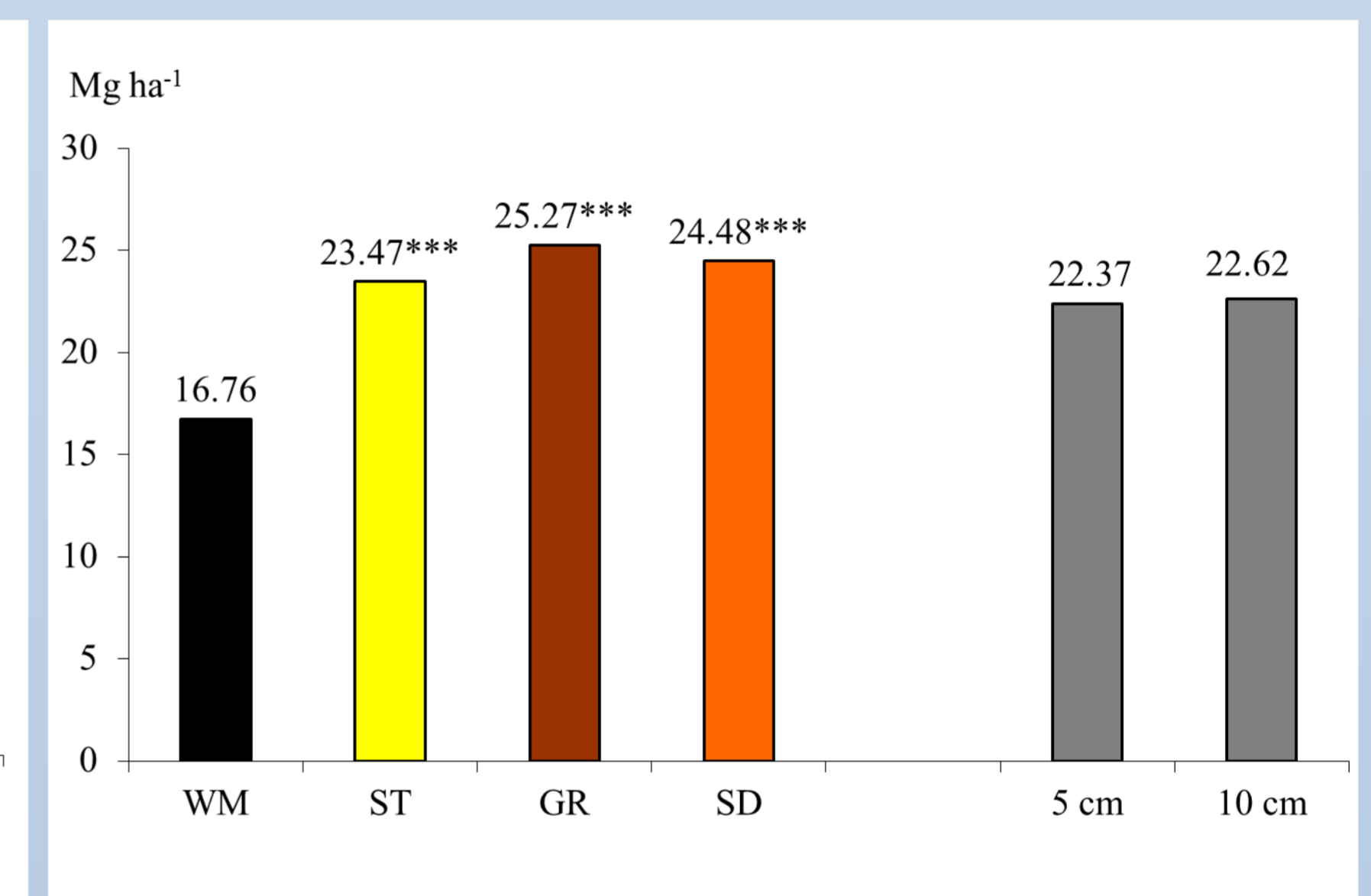


Figure 7. The influence of organic mulches and different thickness of mulch layer on red beet (*Beta vulgaris* L.) productivity. WM – without mulch, ST – straw, GR – grass, SD – sawdust. Significantly different: \*\*\*99.9% probability level.

In the 2019 study, it was found that in the presence of warm weather, the soil temperature in the fields covered with straw and grass mulch was significantly lower by 1.8% compared to the without mulch fields (Fig. 5). Sawdust mulch had no significant effect on soil temperature. In straw-covered fields, there was a significant decrease in soil temperature compared to the without mulch fields. All fields covered with mulch better retained soil moisture (Fig. 6). Grass mulch increased the yield of red beets (*Beta vulgaris* L.) by 1.5 times compared to the without mulch fields (Fig. 7). Different layer thicknesses did not significantly affect the yield of red beets (*Beta vulgaris* L.).



Figure 8. The experiment fields of organic mulch

• **Conclusion:** showed that all organic mulches reduced from 3.1 to 3.6 times weed germination and growth. Organic mulches had a different effect on the species composition of perennial and annual weeds. Mulching with a thicker (10 cm) mulch layer was less effective than a thinner (5 cm layer). The grass and straw mulches significantly reduced from 1.8 to 4.7 % the soil temperature compared to the non-mulched plots. Organic mulch significantly increased from 1.2 to 2.0 times soil moisture. A thicker (10 cm) mulch layer significantly increased soil moisture (1.5 times) and temperature (1.0 times) compared to thinner (5 cm) mulch layer. All organic mulches significantly increased from 1.4 to 1.5 times the yield of red beets (*Beta vulgaris* L.). The highest yield was obtained in treatment with grass-mulched soil.

• **Keywords:** organic mulch; soil temperature; moisture; soil weediness