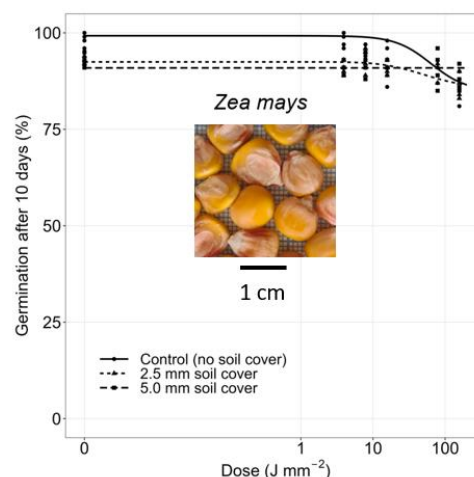
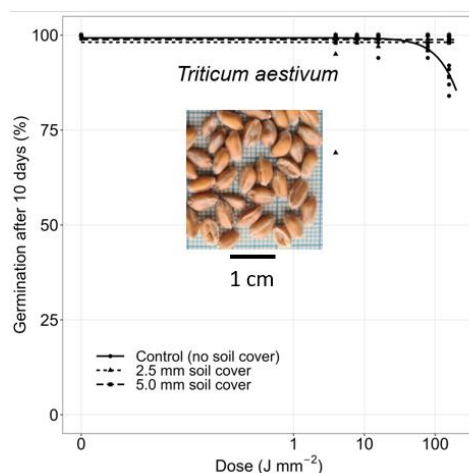


How does laser irradiation affect crop seeds?

Experiments with crop seeds

Crop seeds often pose a serious problem in the following crops as volunteers. Therefore, we studied if seeds of wheat (*Triticum aestivum*) and maize (*Zea mays*) could be harmed or destroyed with laser dosages relevant to weed control of weed seedlings. We exposed the seeds to increasing dosages of laser energy with a thulium-doped 50 W fibre laser with a wavelength of 2 μm and a diameter of 2 mm developed for weed control. The seeds were exposed to laser directly on the seed surface or after being covered with soil (2.5 or 5 mm).

Results of dose-response experiments with wheat and maize seeds 10 days after irradiation. Seeds were irradiated directly on the seed surface or after they have been covered with 2.5 mm or 5 mm soil. The straight lines show there is no effect of the irradiation on the germination percentage. The photo shows a germination box with untreated maize seeds (left) and seeds which have received the highest dose (157 J mm^{-2}).



Results and conclusion

When wheat and maize seeds were irradiated directly on the seed surface, the germination ability was only affected a little by the highest doses, and the germination ability was never reduced to more than about 80%. Seeds covered with 2.5 mm or 5 mm soil were not significantly affected by the laser treatments. Increasing laser doses on the seed surface resulted in increasing infection of fungi and reduced the growth and vigour of the plants. Controlling large seeds from volunteers on the ground while weed seedlings are controlled with a laser robot may be possible in the future but requires much higher energy dosages than necessary to control weed seedlings (157 J mm^{-2}). Additionally, a seed recognition tool based on artificial intelligence needs to be developed.



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