

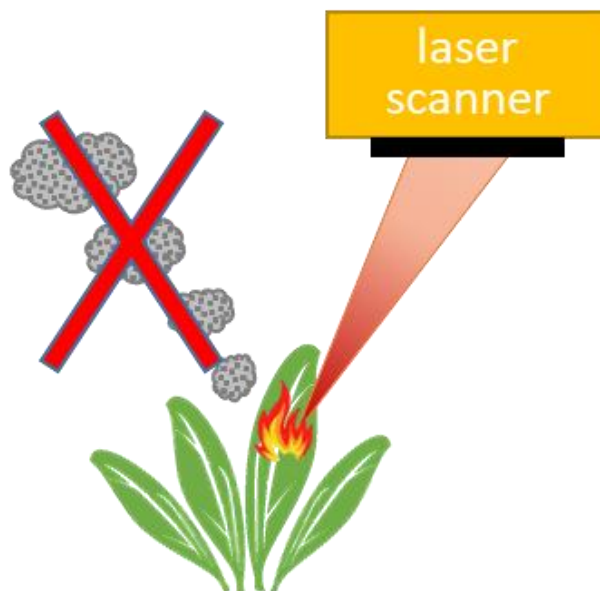
Possible release of hazardous substances during weed control using laser radiation

Functional principle of laser weed control

Weed control by means of laser radiation in the near-infrared wavelength range is based on a thermally induced process: the interaction of the radiation with the plant material, ideally the meristem, i.e. the growth center of the weed plant, generates thermal energy through radiation absorption, and the temperature rises. Above a specific temperature threshold, the meristem is irreversibly damaged by thermal decomposition of organic compounds, and the plant dies.

Does this process lead to the release of hazardous substances?

Thermal material processing methods, such as those using lasers, often result in the release of hazardous substances in the form of fumes or particulate and gaseous emissions. This is a result of heating the material above the respective sublimation, vaporization or decomposition temperature, which causes at least part of the material to be locally transferred into the gaseous phase. In contrast, the intention of plant control by means of laser radiation is to apply a well-defined amount of energy in the form of laser pulses, which cause lethal cell damage, but only reach temperatures at which no significant amount of material is transferred into the surrounding air. Thus, this kind of laser processing is almost free of hazardous substances.



Practical conclusion

Provided that no burning occurs or the wrong plants are hit by the laser beam, no hazardous substances are released during weed control by means of laser radiation, so that no special protective measures are required in this respect and no environmental hazard arises.

Authors: LZH

Date: March 2022