

# Applicability of ash from combustion of *Sida hermaphrodita* R. as soil improver and its effects on crop size

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## 1. Introduction

High biomass accumulation and multiple ecological benefits of *Sida hermaphrodita* (Virginia fanpetals) crops has resulted in growing interest among researchers in various countries [1,2]. The performed combustion tests showed a good applicability of the pellets produced from the older, lignified *Sida* biomass [2]. A *Sida hermaphrodita* was also used as an substrate for fermentation process and ability of its digestate to fertilize marginal sandy soil was approved [1].

The objective of this study is to assess applicability of ash from combustion of *Sida* as soil improver and its effects on crop size were checked. This may confirm that the value chain, consisting: *Sida hermaphrodita* plantation, its combustion and ash utilisation as fertiliser, fulfil the rules of the best practise in the circular bioeconomy.

## 2. Methods

The quality and effects of the *Sida* ash as soil improver was checked in laboratory test (in plant pots) for the 5 chosen plants: *Avena sativa* (the common oat), *Lolium perenne* L. (ryegrass), *Lupinus luteus* (annual yellow-lupin), *Pelargonium L'Hér.* (Pelargonium) and *Raphanus sativus*. Besides the field trials has been performed for *Avena sativa*, *Lolium perenne* L. and *Lupinus luteus*. The crops grown on soil fertilised using ash was compared with the ones grown on the soil fertilised using classic, characteristic fertilization for the plants. In previous studies [3] it was established that 1 kg ash from *Sida* contains 0,0167 kg P, 0,0434 kg K (lack of nitrogen). It was found in this studies that important for fertilization anions and cations from ash are hardly soluble. Each study was performed in two trials. The crops has been taken after 40 days of vegetation period.

## 3. Results

The application of ash under laboratory conditions (in plant pots) led to very good results. In the case of *Avena sativa* the increase of fresh biomass weight was 28,7% for 0,009 kg ash/pot and 45,7% for 0,018 kg ash/pot application. Use of ash, 0,012 kg/pot, led to increase of *Lupinus luteus* crop 45,2% and 18,6% for two times higher dose. Much better results were observed after application of ash to a *Raphanus sativus* cultivation; crops increased even 289% after application of 0,006 kg ash/pot. The highest increase was established for *Pelargonium L'Hér* cultivation, 856% after application of 0.006 kg ash/pot. *Lupinus luteus* crops (under field trial conditions) towards application of ash in amount (0) no ash, (1) 0,4 kg/m<sup>2</sup> and (2) 0,8 kg/m<sup>2</sup>. The crops increased 63% (case 1) and 65% (case 2).

## 4. Conclusions

Ash after *Sida hermaphrodita* combustion can increase significantly crops of various plants. The application of 0,006 kg ash/pot can increase the fresh biomass crops of *Pelargonium L'Hér*, by 852%. In the field test the highest increase of crops was observed for *Lupinus luteus* i.e. even above 60% after application of ash in amount 0,4 kg/m<sup>2</sup> and more.

## 5. References

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