

# Influence of composted pine bark total and water-soluble content of manganese and iron in composts

## Wpływ kompostowania kory sosnowej na zawartość rozpuszczalnego w wodzie manganu i żelaza w kompostach

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Pine bark is characterised, among others, by a wide carbon to nitrogen ratio and this restricts its direct utilisation in agriculture, although it has been used in horticulture and forestry for many years. In order to limit the unfavourable properties of this bark, it is subjected, among others, to composting with some addition of nitrogen, most frequently in its mineral form (urea, ammonium nitrate). In forestry, other sources of nitrogen than mineral fertilisers are sought. These include mixtures of plant mixtures containing legumes. The aim of this research project was to ascertain possibilities of plant mixture utilisation (field pea, serradella and vetch harvested before flowering) as a source of nitrogen and to assess the impact of such treatment on changes in compost chemical composition, including concentrations of microelements.

The experiment was conducted in Świeca Forest Nursery (51°32'N 17°42'E) in two cycles in years 2011–2013. Because of a multifaceted aspect of the trial, this paper presents data regarding quantitative changes of total and water-soluble Mn and Fe forms from the experiment carried out in 2012/13. The presented data derive from the following objects: bark (A) - bark + urea (B) and bark + plant mixture. During the composting period, samples for analyses were collected at 8 dates. In order to determine Mn and Fe total content, 1 g of compost dry matter was collected (3 replicates), incinerated at the temperature of 550°C and the obtained ash was heat-diluted under cover in 3 mol · dm<sup>-3</sup> HCl solution. Compost water extracts (3 replicates) were obtained by shaking for 1 h compost samples in re-distilled water (water : compost ratio 1 : 10 w/v). After centrifuging and filtration, 50 cm<sup>3</sup> of the filtrate was collected for evaporation and the obtained sediment was oxidised using for this purpose nitric(V) acid. Dry residue was diluted in 3 mol · dm<sup>-3</sup> HCl. Both forms of Mn and Fe were determined in the samples described above employing the method of atomic absorption spectrophotometry (AAS). For editorial reasons, in the presented summary, only shares of soluble forms in the total content of elements were presented.

It is evident from data analyses that:

- the examined composts differed significantly with respect to the total Mn and Fe content at decreasing quantities of both elements in a series: A > B > C
- significant differences were shown between composts in the content of soluble Mn and Fe forms at clearly greater quantities and share with respect to the total content for manganese.

Table 1. Average share of soluble forms of manganese and iron in composts (%)

Days of composting	Compost					
	A		B		C	
	share of soluble forms of manganese and iron in composts (%)					
	Mn	Fe	Mn	Fe	Mn	Fe
0	6.33	0.23	2.68	0.26	17.70	0.60
10	5.52	0.32	1.85	0.37	4.58	1.32
27	5.74	0.24	0.41	0.22	1.45	0.56
43	6.07	0.18	2.81	0.14	1.37	0.16
59	6.72	0.18	8.57	0.10	1.77	0.22
81	11.49	0.26	17.81	0.35	1.36	0.16
122	8.21	0.54	15.07	0.69	1.19	0.23
310	1.27	0.41	1.42	0.54	2.80	0.47