

Ashes for organic farming

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Implications

Nowadays only eight percent of the cultivated field area is used for organic farming. The Ministry of Agriculture and Forestry has published the guidelines for the program of organic farming to diversify the supply and the consumption of organic food. The aim is to increase organically arable land to 20% by the year 2020.

The demand of organic fertilizer products is strongly increasing. Interest in forestry by-products (ash, bark, zero fiber, etc.) for use in organic production has recently been exceptionally high. For example, development of pelleted fertilizers with zero fiber, ash and a nitrogen-containing fertilizer material is in progress.

The ash fertilizer contains many valuable nutrients in fairly optimal ratios: these include phosphorus, potassium, manganese, magnesium, sulfur, zinc, calcium, boron, cobalt, copper and smaller amounts of other trace elements. Ashes contain phosphorus in large amounts, which is useful in organic production. More important nutrients than phosphorus and potassium are apparently trace elements. Neutralizing value of the ash is quite rapid compared to many liming materials allowed in organic farming. The price quality ratio of ash as a liming material is also good.

The use of clean wood ash is permissible in organic production. Peat and straw ash cannot be used in organic production because of the fact that in the EU peat is not considered a renewable resource. Restrictions include only inputs from outside of the organic farm.

Background and objectives

Ash suitable for organic farming is little available in Finland. It constitutes mainly from grate boiler bottom ash. There are many ash products in which harmful metals are below allowed maximum limits, but very often they contain peat. For that reason they are not suitable for organic farming.

In wood ash cadmium rarely falls below the limit value of 2.5 mg/kg of dry material, because bark is mainly used in the combustion. Cadmium accumulates in the bark.

Evira controls ash products from power plants. In 2007 the suitability of ash for use as fertilizers as well as the quality and the reuse applications of ash were investigated. 21 ash samples proved suited for fertilization of fields, 33 ash samples only for fertilization of forests and 12 ash samples were banned from use as fertilizer due to high levels of harmful metals.

Evira's registry "*Fertilizers and soil conditioners suitable in organic production*" contains ash products from only four manufacturers.

Since the year 2007 ash samples qualified to field fertilization included also samples which would have qualified to organic farming. To promote organic farming in Finland we should inform and encourage manufactures to register more products to organic ash fertilizers.

Table 1. Trace metals in organic ashes from the years 2007 -2011

Ashes	Arsenic	Mercury	Cadmium	Chromium	Copper	Nickel	Zinc
Allowed Maximum value	25 mg/kg dm.	1,0 mg/kg dm.	2,5 mg/kg dm.	300 mg/kg dm.	600 mg/kg dm.	100 mg/kg dm.	1500 mg/kg dm.
Product 1	0,5	0,01	1,9	15	50	16	830
Product 2	2		1,6	28	87	26	348
Product 3		0,01	1,4	113	37	28	220
Product 4	1	0,01	2	24	99	22	340
Product 5	17	0,28	0,7	60	68	33	160
Product 6	5,2	0,38	0,6	85	320	64	100
Product 7	14	0,25	1,5	49	44	26	520
Product 8	20		1,3				
Product 9	0,58		2,2	9,4	80	40	950
Product10	17		0,85	33	39	19	440

Key results and discussion

We have analyzed the harmful metals in the ash samples and indeed, heavy metals often limit their use. Also nutrients and neutralizing values are analyzed. Our samples included ashes registered as organic fertilizer products as well as other ash fertilizers used at conventional agriculture. The aim of our work was to ensure the quality of organic ash fertilizers and compare the differences between ash products.

Procedure

ICP-MS and ICP-OES- techniques and microwave dissolution with nitric acid and hydrogen peroxide were used to analyse 13 elements from ash (wood, peat and plants) fertilizers.

Evira method 8129, EPA Method 3050B and 3051A

Neutralizing value was analyzed according to SFS-EN 12945.

The Chemistry and Toxicology laboratory in Evira is accredited according to ISO 17025.

References

Evira.fi website: Titta Suoniitty, Ash from power plants suited for use as fertilizer in most cases, 3.4.2013
www.tuhka.info