FACTSHEET

Summary on Research Study ‚Inactivation of Plants: *Tiger nut sedge* and *Japanese knotweed* in Composting and Anaerobic Digestion‘

A study investigating the destruction of both Japanese knotweed and tiger nut sedge during composting and anaerobic digestion was published by Swiss researchers last summer. The aim of the study was to investigate whether Japanese knotweed and tiger nut sedge would survive during composting and anaerobic digestion, and therefore present a risk of transmission when the resultant compost or digestate is spread to land.

Japanese knotweed (Reynoutria japonica) and tiger nut sedge (Cyperus esculentus) are invasive plant species that create problems across Europe. Japanese knotweed was originally introduced to Europe from East Asia as an ornamental plant, and has since spread across most of the continent; it is particularly destructive due to its strong root system, which can damage buildings (including concrete structures) and roads. Tiger nut sedge on the other hand, is native to parts of southern Europe, but it is also becoming increasingly problematic in more northerly parts, as it is very difficult to remove from fields once it has taken hold.

TERMINOLOGY

Cyperus esculentus is also called:

chufa sedge, nut grass, yellow nut sedge, tiger nut sedge, or earth almond

Reynoutria japonica (synonym Fallopia japonica) is also known as:

Asian knotweed or Japanese knotweed.

The researchers investigated the effect of a range of factors on the survival of Japanese knotweed rhizomes and stems, and tiger nut sedge rhizome nodules. They investigated: the effect of oxygen availability (aerobic vs. anaerobic conditions), temperature (mesophilic vs. thermophilic) and the effect of biological activity inside the composting mass or digestion slurry (by enclosing the plants in either a waterproof plastic or nylon – water permeable - mesh bag).

Composting was carried out at two composting plants: a commercial tunnel composting system and an open-air windrow system, with the nylon mesh and polyethylene bags placed at different distances from the ground and edge of the composting piles. Samples were removed after one and three weeks, and the proportion of germinable parts determined under controlled conditions and compared against a control.

Digestion was carried out in laboratory-scale fermentation vessels, with the bags placed at either 37 °C for 7 and 21 days (mesophilic fermentation) and at 55 °C for 7 and 14 days < (thermophilic fermentation). Germination was then assessed under controlled conditions.

Japanese knotweed

Chufa sedge

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Based on the results obtained, the researchers made the following conclusions:

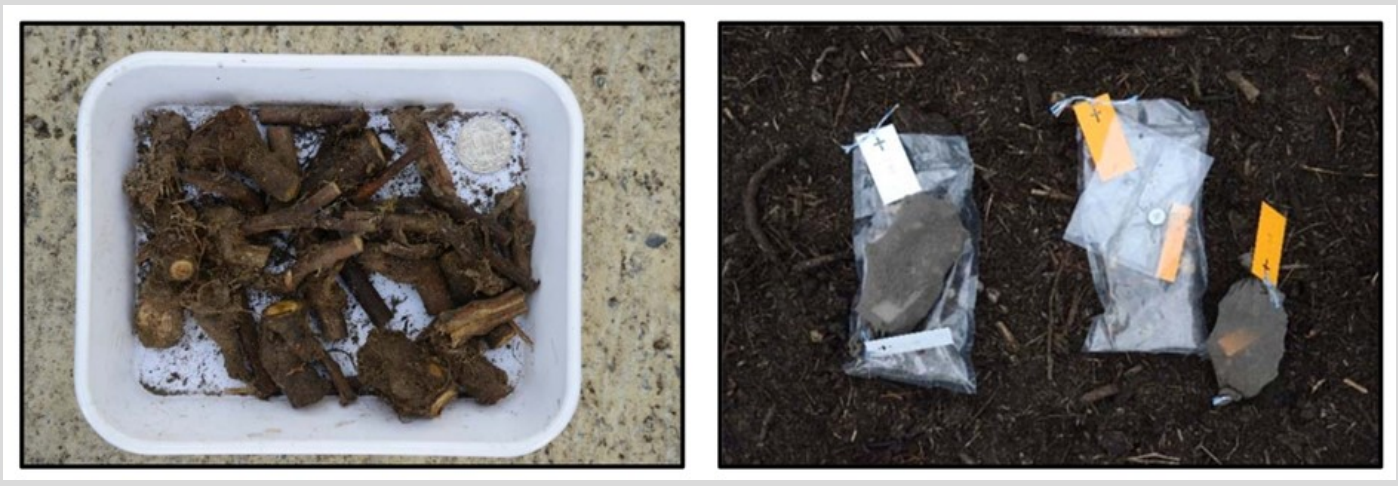
- The rhizomes of Japanese knotweed and the nodules of tiger nut sedge were both inactivated by professional (tunnel) composting or fermentation (anaerobic digestion);
- Survival of both species was possible in open windrow composting systems when the samples were placed near the outermost edge of the pile. However, regular turning of the material would ensure that all material would be incorporated into the centre of the composting mass, thereby ensuring it is destroyed;
- Potential exists in open-windrow composting carried out in fields for the underlying soil to become contaminated. In order to prevent this, the researchers suggest that:
  - Feedstocks know to contain either Japanese knotweed or tiger nut sedge should be incorporated into the centre of the windrow; and
  - Operators should remain vigilant and check whether growth of these plants are observed along the sides of the windrows, then eliminate them immediately.
- Thermophilic digestion was sufficient to inactivate both plant species after one week; and
- There is the possibility that tiger nut sedge nodules could survive one week in a mesophilic anaerobic digester, although they were inactivated after three weeks at 37 °C.

The researchers suggest that operators of composting and anaerobic digestion facilities should take care to ensure that hygienised compost or digestate should not come into contact with incoming feedstocks, as this has the potential to contaminate the finished product.

The principal investigator was Dr Jacques Fuchs (FiBL). The report, published in July 2017, is available in German and French, and can be accessed: here.

The rhizomes of Japanese knotweed and the nodules of tiger nut sedge were both inactivated by professional tunnel composting or anaerobic digestion

Main conclusion of the research



Japanese knotweed rhizomes (L) and bagged samples inserted into the composting mass (R)

About ECN

The European Compost Network (ECN) is the leading European membership organisation promoting sustainable recycling practices by composting and anaerobic digestion of organic resources and guarding over the quality and safe use of the recovered organic fertilisers/soil improvers.

The European Compost Network is a membership organisation with 66 members from 27 European Countries. Members include all European bio-waste organisations and their operating plants, research, policy making, consultants and authorities. ECN represents 21 bio-waste organisations (compost and digestate quality assurance organisations) from 15 European Countries and two from abroad, 25 companies producing bio-based products (organic fertilisers, soil improvers, growing media and, biodegradable plastics), 6 non-governmental organisation of environmental protection organisations, 11 academic (research) institutes in environmental, agricultural and natural sciences and 3 environmental agencies. Via the member organisations, ECN represents more than 3000 experts and plant operators with more than 30 million tonnes of biological waste treatment capacity.

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