

## General/Mixed Industry Byproducts

### 1317. Application of paper mill biosolids, wood ash and ground bark on wild lowbush blueberry production.

Lafond, J.

*Small Fruits Review* 3(1/2): 3-10. (2004); ISSN: 1522-8851

*Descriptors:* bark/ blueberries/ calcium/ chemical composition/ crop yield/ fruits/ iron/ leaves/ magnesium/ mineral content/ nickel/ nitrogen/ nutrient content/ paper mill sludge/ phosphorus/ plant composition/ plant nutrition/ potassium/ soil amendments/ wood ash/ wood residues/ chemical constituents of plants

*Abstract:* Soils in wild lowbush blueberry production are prone to wind erosion and have very low nutrient and water storage capacities. An experiment was initiated to assess paper mill biosolids (PB) mixed with wood ash and ground bark as a soil amendment/fertilizer for wild lowbush blueberry (*Vaccinium angustifolium*) in the Lac St-Jean area, Quebec, Canada. A mixture of PB was applied during spring (mid-May) of the sprout year (1998) on 120 m<sup>2</sup> plots at a rate of 15 t ha<sup>-1</sup> (wet basis) with wood ash (1 and 2 t ha<sup>-1</sup>) and ground bark (0, 3, 6, 9 and 15 t ha<sup>-1</sup>, wet basis). Blueberry leaves were sampled in the first year and wet digestion and dry ashing were performed to determine foliar nutrient concentration. In 1999 and 2000, fruit yields tended to increase with PB with wood ash and ground bark application (31% in 1999 and 29% in 2000). Foliar N, P and K concentrations were increased whereas Ca and Mg were unaffected compared to control. Other nutrients were also determined and only Fe tended to increase with PB application whereas Ni tended to decrease. This study indicated that PB mixed with wood ash and ground bark is a potential nutrient source for blueberry on these poor sandy soils without short-term loss in crop yield. Reproduced with permission from the CAB Abstracts database.

### 1318. Cadmium content in the edible parts of vegetables depending on carbon dynamics in horticultural substrates.

Bosiacki, M. and Tyksinski, W.

*Prace z Zakresu Nauk Rolniczych* 95: 253-263. (2003); ISSN: 0079-4708

*Descriptors:* brown coal/ cadmium/ chemical composition/ crop quality/ fruits/ heavy metals/ leaves/ lettuces/ pine bark/ plant composition/ radishes/ roots/ sawdust/ straw/ substrates/ tomatoes/ wheat/ wheat straw/ Capparales/ chemical constituents of plants

*Abstract:* Pot experiments conducted during 199-2001 in an unheated greenhouse showed that the addition of brown coal, pine sawdust, wheat straw and pine bark in a volumetric proportion of 30% to mineral soil in the first year decreased the Cd content in the storage roots of radish, leaves of lettuce and fruits of tomato. Cd content in the edible parts of these vegetables grown in the same substrates decreased in successive years. The greatest amount of Cd was found in lettuce leaves, and the smallest was recorded in tomato fruits. The decreasing amounts of organic carbon in all studied substrates in the successive years decreased the Cd content in the edible parts of the studied vegetables.

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### 1319. Characterization of industrial by-products.

Miller, D. M.; Miller, W. P.; Dudka, S.; and Summer, M. E. In: Land application of agricultural, industrial, and municipal by-products/ Power, J. F.; Dick, W. A.; Kashmanian, R. M.; Sims, J. T.; Wright, R. J.; Dawson, M. D.; and Bezdicek, D.; Series: Soil Science Society of America Book Series 6. Madison, USA: Soil Science Society of America Inc., 2000; pp. 107-119.

*Descriptors:* application to land/ cement dust/ fly ash/ gypsum/ industrial wastes/ pulp and paper industry/ slags/ waste disposal/ waste utilization/ land application/ paper industry

*Abstract:* The generation and characteristics of industrial wastes and their potentials in relation to agriculture are discussed. Topics covered include the types, disposal and beneficial re-use of industrial byproducts from metal and mineral processing, coal combustion in electric utilities, pulp and paper manufacture, and gypsiferous construction wastes.

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### 1320. Chemical changes during composting of a paper mill sludge-hardwood sawdust mixture.

Marche, T.; Schnitzer, M.; Dinel, H.; Pare, T.; Champagne, P.; Schulten, H. R.; and Facey, G.

*Geoderma* 116(3/4): 345-356. (2003)

NAL Call #: S590 .G4; ISSN: 0016-7061

*Descriptors:* analytical methods/ carbohydrates/ carbon/ carbon nitrogen ratio/ cellulose/ chemical composition/ composting/ composts/ environmental impact/ lignin/ lipids/ mass spectrometry/ microbial activities/ nitrogen content/ nuclear magnetic resonance/ paper mill sludge/ pyrolysis/ recycling/ sawdust/ soil amendments/ sterols/ analytical techniques/ environmental effects/ lipins/ saccharides

*Abstract:* Recycling of paper mill sludge (PMS) by composting is becoming an acceptable practice for converting these chemically complex materials into useful soil amendments, while eliminating negative environmental impacts. The organic composition of a PMS-hardwood sawdust mixture was investigated during composting to better understand the changes in main chemical components. Pyrolysis-field ionization mass spectrometry (Py-FIMS) and cross polarization-magic angle spinning <sup>13</sup>C nuclear magnetic resonance (CP-MAS <sup>13</sup>C NMR) were employed to characterize the organic composition of the PMS composted materials. The spectroscopic data revealed that the major components of the PMS were lipids, sterols, lignin, N-compounds, and carbohydrates. By the end of composting (at biomaturity), concentrations of carbohydrates and lignin became more prominent, while those of lipids, sterols and proteinaceous components decreased. Increases in carbohydrates and decreases in paraffinic C, proteinaceous C and C in OCH<sub>3</sub> groups appeared to be related to increased microbial activity. Other chemical changes observed during composting were increases in aromatic C, phenolic C, and in aromaticity. While the total C and N contents decreased by about only 12.0%, the compost lost 50% of its initial weight. At biomaturity, the compost consisted primarily of polysaccharide/carbohydrate materials, specifically

cellulose and acidic polysaccharides (uronic acids) in combination with smaller quantities of lignin. Reproduced with permission from the CAB Abstracts database.

**1321. Compost effects on soil physical properties and field nursery production.**

Gonzalez, R. F. and Cooperband, L. R. *Compost Science and Utilization* 10(3): 226-237. (2002)  
NAL Call #: TD796.5.C58 ; ISSN: 1065-657X  
*Descriptors:* aggregates/ biomass production/ bulk density/ cattle manure/ composts/ crop production/ ornamental plants/ ornamental woody plants/ paper mill sludge/ poultry manure/ saturated hydraulic conductivity/ sawdust/ shrubs/ silt loam soils/ soil amendments/ soil density/ soil organic matter/ soil physical properties/ soil types/ soil water content/ soil water retention/ stability/ topsoil/ woody plants/ organic matter in soil/ ornamentals/ physical properties of soil/ poultry litter  
*Abstract:* Field production of ornamental shrubs often results in significant topsoil removal and degradation of surface soil physical properties. Building soil organic matter through compost amendments is one way to ameliorate effects from topsoil removal in woody ornamentals production. We amended field soils with three composts to evaluate their effects on soil physical properties and shrub biomass production. Specifically, we applied either duck manure-sawdust (DM), potato cull-sawdust-dairy manure (PC) or paper mill sludge-bark (PMB) composts to a Plano silt loam soil using two application methods: 2.5 cm of compost incorporated into the top 15 cm of soil (incorporated-only) or 2.5 cm of compost incorporated plus 2.5 cm of compost applied over the soil surface (mulched). We grew three shrub species from liners: *Spiraea japonica* 'Gumball', *Juniper chinensis* 'Pfitzeriana', and *Berberis thunbergia* 'Atropurpurea'. Shrub species and soil amendment treatments were established in triplicate in a randomized split plot design. Total soil carbon (TC), bulk density ( $\rho_b$ ), aggregate stability, soil moisture retention capacity (MRC), volumetric moisture content ( $\theta_v$ ), and saturated hydraulic conductivity ( $K_{sat}$ ) were measured over three years (1998 to 2000). We measured above and below ground shrub dry matter production at the end of the first (1998) and second (1999) growing seasons. Mulched treatments resulted in 15%-21% higher TC than the incorporated-only and no-amendment control treatments. Bulk density decreased with increasing TC contents. Greater aggregate stability and the formation of larger aggregates were related to increased TC. Field moisture retention capacity tended to be higher in the incorporated treatments compared to the mulched and nonamended control treatments. Compost amended treatments increased saturated hydraulic conductivity ( $K_{sat}$ ) sevenfold over the nonamended control. There were no compost effects on shrub biomass until the second year of growth. Barberry was the only species to respond significantly and positively to compost application. Specifically, mulched DM compost produced 39-42% greater total Barberry biomass than the other compost treatments and the nonamended control. Our findings showed that compost effects on soil physical properties differed among composts and their subsequent effects on shrub growth were species specific. Reproduced with permission from the CAB Abstracts database.

**1322. Early growth response of container-grown selected woody boreal seedlings in amended composite tailings and tailings sand.**

Khasa, D. P.; Fung, M.; and Logan, B. *Bioresource Technology* 96(7): 857-864. (2005)  
NAL Call #: TD930.A32; ISSN: 0960-8524  
*Descriptors:* clones/ container grown plants/ fertilizers/ fly ash/ hybrids/ increment/ peat/ seedlings/ soil amendments/ substrates/ volume  
*Abstract:* Successful reclamation of saline-alkaline sites may be enhanced by revegetating with species that are tolerant to factors that limit normal plant growth. Boreal woody plants tested in this study have shown promise for use in saline habitats. This study was conducted to assess the effects of amendment treatments (peat, pulp waste, agriboostReg., a combination of pulp waste and fly ash, and mineral fertilizer) on the early growth of three hybrid poplar clones and three coniferous species. Twelve-week and 18-week container-grown hybrid poplar clones and coniferous species, respectively, were monitored for 12 weeks in pot culture in both composite tailings (CTs) and tailings sand (TS) materials obtained from the oil sands plant, Syncrude Canada Ltd., Ft. McMurray, Alberta. These substrates with low nutrients, organic matter, and water-holding capacities, were amended with different organic materials at different rates. Growth, as assessed by the volume increment in both substrates, was generally better for the first 6 weeks than for the last 6 weeks. Growth was reduced during the last 6 weeks due to nutrient depletion over time in these impoverished substrates. Overall, for both substrates, the mineral fertilizer, 20%, 40% and 60% peat were the best amendment treatments for poplar clones with NM-6 being the most productive clone. For coniferous species, 20% and 40% pulp or peat appear to be the best amendment treatments, with lodgepole pine being the most productive species. The inflexion point of the regression functions were found around 30% rate of the amendment materials. The results also indicated that peat and pulp waste were the best amendment treatments for both hybrid poplars and coniferous species whereas the agriboost and mix (combination of pulp waste and fly ash) were the worst. Reproduced with permission from the CAB Abstracts database.

**1323. Effect of different organic materials with fly ash in integrated plant nutrient system for groundnut (*Arachis hypogaea*).**

Karmakar, S.; Mitra, B. N.; and Ghosh, B. C. *Indian Journal of Agronomy* 50(2): 152-155. (2005)  
NAL Call #: 22 IN235; ISSN: 0537-197X  
*Descriptors:* application date/ crop yield/ dry matter accumulation/ fly ash/ groundnut oil/ groundnuts/ lateritic soils/ leaf area index/ nodules/ nutrient uptake/ organic amendments/ paper mill sludge/ plant nutrition/ soil chemical properties/ soil types/ yield components/ arachis oil/ chemical properties of soil/ LAI/ peanut oil/ peanuts  
*Abstract:* An investigation was carried out during the dry season (February-May) of 1996 and 1997 in Kharagpur, West Bengal, India, to study the effect of paper factory sludge (PFS) and fly ash (FA) compared with farmyard manure (FYM) on groundnut (*A. hypogaea* cv. JL 24) and to determine their suitable time of incorporation in acid lateritic soils. The PFS and FYM were applied at 15 kg N/ha and the FA at 10 t/ha. A recommended and uniform dose of

30 kg N, 60 kg P<sub>2</sub>O<sub>5</sub> and 40 kg K<sub>2</sub>O/ha was maintained through these materials and chemical fertilizers (CF). Three dates were chosen for incorporation of the materials, i.e. 30 days before sowing (DBS), 15 DBS and at sowing. PFS+FA+CF increased the dry matter accumulation, leaf area index and nodule number per plant compared to FYM+FA+CF. The beneficial effect was also recorded in yield attributes, yield, oil content in kernel, nutrient uptake and chemical properties of soil. Their incorporation at 15 DBS or at sowing was more advantageous than that at 30 DBS.  
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**1324. Effect of different organics and fly ash on performance of transplanted rice.**

Karmakar, S.; Mitra, B. N.; and Ghosh, B. C.  
*Oryza* 43(1): 25-28. (2006); ISSN: 0474-7615  
*Descriptors:* application date/ application rates/ dry matter accumulation/ farmyard manure/ fly ash/ organic amendments/ panicles/ plant height/ rice/ sludges/ FYM/ paddy  
*Abstract:* A field investigation was carried out during the wet seasons of 1995 and 1996, in Kharagpur, West Bengal, India, to evaluate the impact of different combinations of nutrient sources (farmyard manure, paper factory sludge and fly ash) and their time of incorporation on the performance of transplanted rice. Paper factory sludge at 30 kg N ha<sup>-1</sup> plus fly ash at 10 t ha<sup>-1</sup> combined with chemical fertilizers produced higher plant height and dry matter accumulation than farmyard manure at 30 kg N ha<sup>-1</sup> in similar combination throughout the growth stages of rice. A similar trend was noted in case of yield attributes, i.e. number of panicles m<sup>-2</sup> and grains panicle<sup>-1</sup>. However, with respect to grain yield, application of paper factory sludge along with fly ash and chemical fertilizer proved to be superior (3.4 t ha<sup>-1</sup>) to farmyard manure in similar combination (3.3 t ha<sup>-1</sup>) during 1995 and also equally effective during 1996 (3.9 t ha<sup>-1</sup> and 3.8 t ha<sup>-1</sup>, respectively). Incorporation of paper factory sludge or farmyard manure along with fly ash at transplanting (3.6 t ha<sup>-1</sup>) or 15 days before transplanting proved to be more effective in increasing grain yield than in the incorporation at 30 days before transplanting of rice.  
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**1325. The effect of mulch type for turfgrass establishment within a refined wood fiber mat over plastic.**

Sorochan, J. C. and Rogers, J. N. III  
*Journal of Environmental Horticulture* 19(2): 61-64. (2001)  
NAL Call #: SB1.J66; ISSN: 0738-2898  
*Descriptors:* composts / crop density/ establishment/ lawns and turf/ mulches/ polymers/ seed germination/ seedlings/ sowing date/ straw mulches/ wood fibres/ lawns and sports turf/ mulching materials/ United States of America  
*Abstract:* The germination and establishment of perennial ryegrass (*Lolium perenne*) and supina bluegrass (*Poa supina*) within a refined wood fibre mat (Ecomat) placed on plastic sheeting was evaluated using seven mulches and a control with no mulch. Percent turfgrass cover (0-100%) was visually estimated as a measure of seedling density at 7, 14, 21, and 28 days after sowing. Three field experiments were initiated on 3 July 1995, 29 September

1995, and 5 July 1996 in Michigan, USA. The three sowing dates were chosen to show the effects of mulches under optimal and sub-optimal growing conditions for cool season turfgrasses. The seven mulches consisted of hydrated fibre mulch, copolymer of sodium acrylamide, crumb rubber, straw, fine grade compost, pelletized fibre mulch, and a native Capac loam soil. Percent turfgrass cover differed among species for the seven mulch treatments and the control, and the three sowing dates. Overall, perennial ryegrass achieved 25% greater cover than supina bluegrass. The straw, pelletized fibre mulch, and hydrated fibre mulch resulted in the greatest turfgrass cover regardless of sowing date. Crumb rubber performed equal to these mulches only during the 29 September 1995 sowing trial. In summary, the use of a particular mulching material will enhance turfgrass cover during seed germination.  
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**1326. Effect of silicon sources and fertility levels on transplanted rice.**

Sudhakar, P. C.; Singh, J. P.; and Kalyan Singh  
*International Rice Research Notes* 29(2): 61-63. (2004)  
NAL Call #: SB191.R516; ISSN: 0117-4185  
*Descriptors:* application rates/ crop yield/ dry matter accumulation/ fly ash/ nitrogen fertilizers/ phosphorus fertilizers/ potassium fertilizers/ rice/ rice straw/ silicon fertilizers/ slags/ straw/ sulfur fertilizers/ zinc fertilizers/ paddy/ phosphate fertilizers/ potash fertilizers/ sulphur fertilizers  
*Abstract:* A field experiment was conducted during 2001 and 2002 at Varanasi, Uttar Pradesh, India to evaluate different industrial and farm wastes as a source of Si for sustained rice yields. The treatments consisted of four fertilizer levels (80-40-40-16-0.25, 120-60-60-24-0.50, 160-80-80-32-0.75 and 200-100-100-40-1.00 kg N-P-K-S-Zn EDTA/ha) and three Si sources (basic slag, fly ash and rice straw compost, 120 kg Si/ha). Si application increased dry matter production as well as grain and straw yields under both low and high fertilizer levels. All Si sources had positive effects on grain and straw yields, with basic slag giving the best results.  
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**1327. Effect of solid residues from the cellulose industry on plant growth.**

Jordan, M. and Rodriguez, E.  
*Journal of Plant Nutrition and Soil Science* 167(3): 351-356. (2004)  
NAL Call #: 384 Z343A ; ISSN: 1436-8730  
*Descriptors:* ash/ bark/ biomass/ cellulose/ cellulosic wastes/ fertilizers/ fly ash/ forest soils/ grit/ growth/ nutrient solutions/ organic soils/ pulp mill effluent/ rice/ sludges/ soil types/ solid wastes/ substrates/ waste management/ waste utilization/ kraft mill effluent/ paddy  
*Abstract:* An alternative use of solid organic and inorganic residues as fertilizers from a Kraft pulp industry was studied. Residues of inorganic nature, such as ashes, fly-ashes, dregs, grits, as well those rich in organic matter, primary sludge and brown stock rejects, were examined for plant growth enhancement. These residues, all alkaline in nature, used in different concentrations together with soil, bark, organic soil or mixed with a nutrient solution, were

tested on the growth of Monterey pine (*Pinus radiata*), *Eucalyptus globulus*, rice (*Oryza sativa* cv. 'Diamante'), and duckweed (*Lemna minor*) under greenhouse and in-vitro conditions, respectively. Responses varied according to plant species, type, and waste content in combination with substrate. For Monterey pine, substrates including ash, fly-ash, and dregs promoted growth; in *Eucalyptus* seedlings dregs and fly-ash were also beneficial. Primary sludge and ash were favorable for rice growth. Duckweed increased frond number and plant biomass when grown in water containing fly-ash and primary sludge extracts, combined with nutrient salts.

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**1328. Effects of additional waste paper on the pattern of composting with dairy manure.**

Ichikawa, A.; Nakatani, H.; Kato, H.; Masuda, T.; Kano, M.; and Kawabe, T.

*Research Bulletin of the Aichi ken Agricultural Research Center (Japan)* 31: 275-279. (Dec. 1999); ISSN: 0388-7995.

*Notes:* 3 tables; 8 fig. Summaries (En, Ja). Citation notes: JP (Japan).

*Descriptors:* waste paper/ composting/ dairy manure

*Abstract:* We conducted an experiment to examine effects of additional waste paper (WP) and sawdust for adjustment moisture on the pattern of composting with dairy manure. The dairy manure obtained from dairy free-stall housing were mixed with WP and/or sawdust in the ratio of 1:1.5 (volume). WP used in this experiment was crushed by machines and the dairy manure contained about 86% water. Five composting treatments were prepared; 1) the dairy manure mixed with WP (1.0 : 1.5 in volume); 2) the dairy manure mixed with WP and the sawdust (1.0 : 1.0 : 0.5); 3) the dairy manure mixed with WP and the sawdust (1.0 : 0.75 : 0.75); 4) the dairy manure mixed WP and the sawdust (1.0 : 0.5 : 1.0); 5) the dairy manure mixed with the sawdust (1.0 : 1.5). These raw materials (composts) were fermented in the composting boxes (150L) maintained under aerobic condition by blowing air from the bottom during 8 weeks. Although the compost mixed with only WP had lower temperature than the other composts during initial fermentation period (1th week), it had the similar pattern of temperature change to the other composts since 2nd week. During the experiment period, the decreasing rates of piling volume, organic matter content, combustion energy and water content in composts were strengthened with increasing the rate of WP in the composting materials. These results indicated that WP mixed with dairy manure obstructed aeration for composting, but its decomposition rate was higher more than that of sawdust in the composting process. Therefore, on the using of WP to adjust moisture for composting dairy manure, it is more effective to mix with sawdust.

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**1329. Effects of organic amendments on selected physical and chemical properties of rootzones for golf greens.**

Cook, A. and Baker, S. W.

*Journal of Turfgrass Science* 74: 210. (1998)

*Descriptors:* bark/ bulk density/ coir/ crop residues/ fen soils/ golf green soils/ incorporation/ organic amendments/

paper mill sludge/ peat/ physical properties/ porosity/ sand/ sandy loam soils/ sewage sludge/ shear strength/ straw/ wood chips/ wood residues/ coconut fibre

*Abstract:* A laboratory study was conducted to examine the properties of 10 organic amendments for use in sand-dominated golf green root zones. Green waste, bark + timber + paper pulp, coir, sewage + straw, rape residues, pine wood fibre, wood chip, peat, fen soil and sandy loam soil were mixed at 10:90, 20:80, 30:70 or 40:60 ratios with two different sands [particle size distribution tabulated]. Root zone hardness values and bulk density decreased with the increase in incorporation rates of the amendments. Conversely, shear strength and loss on ignition values had a negative relationship with amendment incorporation rate. Where measured, the pH of the non-peat root zones was far greater than for the peat mixes (6.5-8.4 compared with 4.6, respectively for the 70:30 mixes) and this was identified as a possible disadvantage for some of the non-peat products. The use of organic amendment materials is discussed in the light of these results and results from an earlier phase of the work in which drainage rates and porosity were measured and compared with the US Golf Association's recommendations for the physical properties of root zone mixes.

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**1330. Effects of organic and mixture media formulas on the growth of garlic sprout and its nutritional quality.**

Du HuiFang; Cheng ZhiHui; Xue XiaoNa; and Zhang XueLian

*Journal of Northwest Sci-Tech University of Agriculture and Forestry: Natural Science Edition* 34(10): 91-95. (2006); ISSN: 1671-9387

*Descriptors:* chemical composition/ crop quality/ crop yield/ free amino acids/ garlic/ growing media/ growth/ mushroom compost/ nutrient content/ organic amendments/ peat/ plant composition/ plant height/ poultry manure/ sawdust/ slags/ sprouts/ chemical constituents of plants/ potting composts/ poultry litter/ rooting media

*Abstract:* The effects of 5 media formulas, which were mixed with mushroom culture, sawdust, slag and peat, and added with sterilized chicken droppings and organic compound fertilizers, on the growth and nutrient content of garlic (cv. G88) sprouts were investigated, using soilless culture as the control. The growth and nutrient content of the garlic sprouts cultured in the media were better than those cultured in the soil. The plants cultured in the media were taller with larger width and had higher contents of free amino acid, garlicin and nutritional elements, as well as yield. The organic culture medium formula A3 (4 portions of mushroom and one portion of peat) was the best for garlic cultivation, producing the strongest plants with the highest yield and quality.

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**1331. Estimation of the possibility of application of stillage for fertilization purposes.**

abetowicz, J.; Stepien, W.; and Gutowska, A.

*Prace Instytutow i Laboratoriow Badawczych Przemyslu Spozywczego* 57: 41-49. (2002); ISSN: 0554-9043.

*Notes:* Original title: Ocena mozliwosci zastosowania wywaru gorzelnianego do celow nawozowych.

*Descriptors:* agricultural wastes/ brown coal/ chemical composition/ composts/ dust/ fertilizers/ industrial wastes/ molasses/ potatoes/ rye/ sawdust/ straw/ wood residues/ farm wastes

*Abstract:* The fertilization value of stillage from rye, potato and molasses were estimated based on the chemical composition of stillages received for 3 years from several distilleries in Mazowsze and odz regions (Poland) or from compost heaps made of stillages and solid agricultural wastes. Aside from the three kinds of stillage, cereal straw, pine sawdust and brown coal dust were also used in the study. The results indicated that stillage may be applied as a fertilizer for plants on ploughland, permanent grassland, orchards and industrial crop plantations. Stillage may also be used for preparation of compost by adding it in suitable proportion to organic waste materials like straw, sawdust, some other wood wastes and brown coal dust. After appropriate transformation, the stillage may be used as a fertilizer in agriculture and horticulture or for ground recultivation.

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### 1332. Evaluation of free-stall mattress bedding treatments to reduce mastitis bacterial growth.

Kristula, M. A.; Dou, Z.; Toth, J. D.; Smith, B. I.; Harvey, N.; and Sabo, M.

*Journal of Dairy Science* 91(5): 1885-1892. (2008)

*NAL Call #:* 44.8 J822; *ISSN:* 0022-0302

*Descriptors:* bacterial count/ bovine mastitis/ cattle housing/ cows/ dairy cattle/ dairy cows/ disease control/ fly ash/ hygiene/ lime/ limestone/ litter/ mastitis/ mats/ teats/ wood shavings/ cattle sheds

*Abstract:* Bacterial counts were compared in free-stall mattresses and teat ends exposed to 5 treatments in a factorial study design on 1 dairy farm. Mattresses in five 30-cow groups were subjected to 1 of 5 bedding treatments every other day: 0.5 kg of hydrated limestone, 120 mL of commercial acidic conditioner, 1 kg of coal fly ash, 1 kg of kiln-dried wood shavings, and control (no bedding). Counts of coliforms, *Klebsiella* spp., *Escherichia coli*, and *Streptococcus* spp. were lowest on mattresses bedded with lime. Mattresses bedded with the commercial acidic conditioner had the next lowest counts for coliforms, *Klebsiella* spp., and *Streptococcus* spp. Wood shavings and the no-bedding control had the highest counts for coliform and *Klebsiella* spp. Compared with wood shavings or control, fly ash reduced the counts of coliforms, whereas for the other 3 bacterial groups, the reduction was not always significant. *Streptococcus* spp. counts were greatest in the control group and did not differ among the shavings and fly ash groups. Teat swab results indicated that hydrated lime was the only bedding treatment that significantly decreased the counts of both coliforms and *Klebsiella* spp. There were no differences in *Streptococcus* spp. numbers on the teats between any of the bedding treatments. Bacterial populations grew steadily on mattresses and were generally higher at 36 to 48 h than at 12 to 24 h, whereas bacterial populations on teats grew rapidly by 12 h and then remained constant. Hydrated lime was the only treatment that significantly reduced bacterial counts on both mattresses and teat ends, but it caused some skin irritation.

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### 1333. Evaluation of stability of compost prepared with korean food wastes.

Lee, In Bog; Kim, Pil Joo; and Chang, Ki Woon

*Soil Science and Plant Nutrition* 48(1): 1-8. (2002)

*NAL Call #:* 56.8 SO38 ; *ISSN:* 0038-0768

*Descriptors:* Agriculture/ Soil Science/ Waste Management: Sanitation/ Korean Food Waste Based Compost: Stability/ Agricultural Utilization/ Decayed Wood Dust/ Dried Paper Mill Sludge/ Nutritional Quality/ Organic Soil Amendment/ Saw Dust

*Abstract:* Food wastes were composted with sawdust, dried paper mill sludge, and decayed wood dust to reduce the volume of wastes and to produce a stable organic soil amendment. To determine the stability for agricultural utilization, the compost maturity was evaluated using physical, chemical, and biological parameters. Temperature of the inner compost heap remained high at over 50°C during the 80 d of composting, but the chemical and physical parameters apparently changed between 30 and 50 piling d: pH was a weakly acidic of the initial stage and neutral after 30 d of composting. The C/N ratio decreased to less than 12 after 65 d of composting, but the C/N ratio of the products was less than 0.5 time that of the initial value after 35 d of composting. Reducing sugar contents changed significantly between 40 and 45 d of composting, and the Y value that indicated color changes of the water extracts decreased and became stabilized at around 3 after 50 d of composting. Ring types and color on circular paper chromatograms showed an apparent difference before and after 40 d of composting. The content of sodium (Na), which might be one of the most harmful elements in Korean food wastes for agricultural utilization, increased from 12 to 17 g kg<sup>-1</sup> with time and Na mostly occurred in a water-soluble form. Acetic acid was the main component of volatile organic acids, and total organic acids were produced at a very high rate (500-700 mg kg<sup>-1</sup>) during the first 5-30 d of composting and then the rate decreased rapidly to below 300 mg kg<sup>-1</sup> after 35 d of composting. Germination index of Chinese cabbage in water extracts fluctuated with compost pile turning to a value below 50 by 40 d of composting, due to the effects of high contents of organic acids and Na. The value exceeded 50 after 45 d of composting but did not increase further with continuous composting, which might be due to the high content of Na. Lettuce, a sensitive species, was scarcely germinated in water extracts of the food compost. Consequently, the high content of Na in Korean food waste compost, in spite of maturity, could be a limiting factor for agricultural utilization. The effects of Korean food waste compost on plant growth and soil conditions should be evaluated further at the field level.

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### 1334. Fertilizer nitrogen replacement value of food residuals composted with yard trimmings, paper or wood wastes.

Sullivan, D. M.; Fransen, S. C.; Bary, A. I.; and Cogger, C. G.

*Compost Science and Utilization* 6(1): 6-18. (1998)

*NAL Call #:* TD796.5.C58 ; *ISSN:* 1065657X [CSUTE]

*Descriptors:* food products/ land use/ nitrogen/ nitrogen fertilizers/ plants (botany)/ recycling/ soil conservation/ waste paper/ wood/ food residuals/ grass/ landscapes/ soil amendment/ wood waste/ yard trimmings/ composting

*Abstract:* Composting offers an opportunity to recycle food

waste as a soil amendment. A three year growth trial was conducted to determine the fertilizer nitrogen (N) replacement value of food waste composts for cool season perennial grass production. Six composts were produced in a pilot-scale project with two composting methods (aerated static pile and aerated, turned windrow). The aerated, turned windrow method simulated "agitated bay" composting systems, which utilize routine mechanical agitation. Compost bulking agents included yard trimmings, yard trimmings + mixed paper waste, and wood waste + sawdust. Finished composts had Kjeldahl N concentrations ranging from 10 to 18 g N/kg. For the growth trial, composts were incorporated into the top eight to 10 cm of a sandy loam soil at application rates of approximately 155 Mg/ha (about 7 yd<sup>3</sup>/1000 ft<sup>2</sup>). Tall fescue (*Festuca arundinacea* Schreb. 'A.U. Triumph') was seeded after compost incorporation, and was harvested repeatedly at a late vegetative growth stage (April to November; approx. 35 days regrowth between harvests). Grass yield and grass N uptake did not respond to compost application during the first year. During the second and third years after application, composts were a consistent source of slow-release N. They supplied the fertilizer N equivalent of 0.70 kg N/ha/day over a 140-day period (April to August) in both years. The N supplied by composts in the second and third year after application was valued at \$0.70 to \$1.90 per dry tonne (Mg) compost per year, using a fertilizer N cost of \$1/kg N. Food waste composts with significant slow-release N properties were produced with either the aerated static pile composting method or the aerated, turned windrow method. Composts with higher N concentrations had higher fertilizer N replacement value. The slow release N supplied by food waste composts is ideally suited for urban landscapes, where a moderate, consistent rate of plant growth is highly desirable.

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### 1335. Guide for Industrial Waste Management.

United States Environmental Protection Agency [Also available as: EPA530-R-03-001].

*Notes:* Chapter 7 contains soil improvement guidelines and considerations

<http://www.epa.gov/epawaste/nonhaz/industrial/guide/index.htm>

*Descriptors:* industrial waste management/ land application/ soil amendment

### 1336. Influence of Container Mulches on Irrigation and Nutrient Management.

Altland, J. and Lanthier, M.

*Journal of Environmental Horticulture* 25(4): 234-238. (Dec. 2007)

*NAL Call #:* SB1.J66; ISSN: 0738-2898

*Descriptors:* containers/ mulches/ irrigation/ nutrient management/ sawdust/ crumb rubber/ hydrangea

*Abstract:* An experiment was conducted in 2005 and repeated in 2006 to determine the influence of mulch products and controlled release fertilizer (CRF) placement on irrigation and nutrition requirements of container-grown crops. Hydrangea (*Hydrangea macrophylla* 'Fasan' and 'Endless Summer') were grown in 2.7 L (1 gal) containers with CRF placed above or below the mulch. Non-mulched controls were also maintained. Mulch products included geotextile discs, coco discs, plastic discs, hazelnut shells, sawdust, Biotop, and crumb rubber. Hydrangea growth,

plant quality, foliar color, and foliar nutrition were measured, as well as water loss from containers. Controlled release fertilizer placed below mulch resulted in larger plants with higher quality ratings and foliar N levels compared to CRF placed above the mulch, and similar or superior size, quality and foliar N compared to non-mulched containers. After correcting for differences in plant size, there were few and minor differences in water loss from hydrangea between mulched and non-mulched containers. This citation is from AGRICOLA.

### 1337. Kraft mill residues effects on Monterey pine growth and soil microbial activity.

Jordan, M.; Sanchez, M. A.; Padilla, L.; Cespedes, R.; Osses, M.; and Gonzalez, B.

*Journal of Environmental Quality* 31(3): 1004-1009. (2002)  
*NAL Call #:* QH540.J6; ISSN: 0047-2425

*Descriptors:* fly ash/ forest soils/ microbial activities/ polluted soils/ pulp mill effluent/ residual effects/ seed germination/ seedling growth/ seedlings/ soil flora/ soil ph/ soil pollution/ soil types/ soil water content/ solid wastes/ waste management/ kraft mill effluent/ microbial communities

*Abstract:* The production of bleached Kraft pulp generates inorganic and organic residues that are usually deposited on the soil surface or land-filled. Studies conducted to address the impact of these wastes on the environment are scarce. In this work, Monterey pine (*Pinus radiata*), an important tree for pulping, was evaluated for germination and development under greenhouse conditions in forest soils (sandy and clay soils) exposed to solid residues of the cellulose industry using the Kraft process. Soils exposed to 10 to 60% ashes, 10 to 70% fly ashes, or 10 to 30% dregs allowed substantial seed germination and seedling growth. In contrast, soils exposed to low proportions of brown rejects, grits, or a mixture of all these residues were detrimental for germination, plant growth, or both. The strongest negative effect (no germination) was observed with as low as 10% grits. The changes in pH and/or water content caused by solid wastes did not correlate with detrimental effects observed in various soil-residue combinations. No significant changes in the microbial community of soils exposed to these solid residues were observed by determination of culturable counts, or by terminal-restriction fragment length polymorphism analysis of the microbial community DNA. The presence of organic residues did not affect the ability of the soil microbial community to remove typical pulp bleaching chloroaromatics. However, inorganic wastes strongly decreased the removal of such compounds. Reproduced with permission from the CAB Abstracts database.

### 1338. A laboratory and glasshouse evaluation of chicken litter ash, wood ash, and iron smelting slag as liming agents and P fertilisers.

Yusiharni, B. E.; Ziadi, H.; and Gilkes, R. J.

*Australian Journal of Soil Research* 45(5): 374-389. (2007)  
*NAL Call #:* 56.8 Au7; ISSN: 0004-9573

*Descriptors:* apatite/ application rates/ ash/ calcite/ calcium carbonate/ citric acid/ extraction/ lateritic soils/ liming/ nutrient availability/ phosphorus fertilizers/ poultry manure/ quartz/ salts/ slags/ soil types/ wood ash/ phosphate fertilizers/ poultry litter

*Abstract:* Standard AOAC methods of chemical analysis

have been used to characterise the industrial byproducts partly burnt chicken litter ash (CLA), totally burnt chicken litter ash (CLAT), wood ash (WA), and iron smelting slag, for use as a combined liming agent and phosphate (P) fertilizer. These materials are effective liming agents with calcium carbonate equivalence of 93-99%. Total P concentrations of CLA (3.6% P), CLAT (4.75% P), slag (0.26% P), and WA (0.44% P) indicate that they would function as P fertilizers when applied at the high rates required for liming soils. The form of P in slag is unknown; CLA and CLAT consist mostly of mixtures of the phosphate mineral apatite with calcite and quartz. WA consists mostly of calcite, quartz, and various salts. For long extraction times, total P dissolved increased in the sequence CA (citric acid) > NAC (neutral ammonium citrate) > AAC (alkaline ammonium citrate). Little apatite persisted in residues of CLA and CLAT after 120 h of CA extraction but considerable amounts of apatite remained in NAC and AAC residues. A glasshouse P-response experiment was carried out with ryegrass (*Lolium perenne*) on an acid lateritic soil with the application of various levels of phosphate as chicken litter ash, iron smelting slag, and wood ash. Monocalcium phosphate (MCP), dicalcium phosphate (DCP), and rock phosphate (RP) were included for comparison purposes. Based on plant yield data, the relative agronomic effectiveness (RE) of DCP compared to MCP was 57, 72, 73, and 94%, respectively, for 4 successive harvests, for RP was 24, 34, 70, and 56%, for chicken litter ash was 13, 16, 33, and 39%, for slag was 8, 9, 16, and 10%, for WA was 6%, 9%, and was effectively zero for the final 2 harvests. For no extraction time was the P soluble in the 3 citrate extractants a reliable predictor of the agronomic effectiveness of these materials as P fertilizers established by plant growth measurements. Reproduced with permission from the CAB Abstracts database.

**1339. Land application of agricultural, industrial, and municipal by-products.**

Power, J. F.; Dick, W. A.; Kashmanian, R. M.; Sims, J. T.; Wright, R. J.; Dawson, M. D.; and Bezdicek, D. Madison, USA: Soil Science Society of America Inc.; Series: Soil Science Society of America book series 6; 653 pp. (2000).

*Notes:* Includes bibliographical references and index. Contents: Chemical, physical, and biological characteristics of agricultural and forest by-products for land application / J.H. Edwards and Arun V. Someshwar -- Description of food processing by-products / Allen V. Barker, Tara A. O'Brien, and Margie L. Stratton -- Characterization of industrial by-products / D.M. Miller .. [et al.] -- Quantities, characteristics, barriers, and incentives for use of organic municipal by-products / Richard M. Kashmanian .. [et al.] -- Soil and by-product characteristics that impact the beneficial use of by-products / Allen V. Barker, Margie L. Stratton, and Jack E. Rechcigl -- Sustainable use of by-products in land management / Leslie R. Cooperband -- Assessing the impacts of agricultural, municipal, and industrial by-products on soil quality / J. Thomas Sims and Gary M. Pierzynski -- Potential impact of land application of by-products on ground and surface water quality / William F. Ritter -- Odor and other air quality issues associated with organic and

inorganic by-products / P.D. Millner and L.L. McConnell -- Composting and beneficial utilization of composted by-product materials / Harold M. Keener, Warren A. Dick, and Harry A.J. Hoitink -- Combining by-products to achieve specific soil amendment objectives / S. Brown and R.L. Chaney -- Estimating the benefits of agricultural use of municipal, animal, and industrial by-products / Wen-Yuan Huang and Yao-Chi Lu -- Examples and case studies of beneficial reuse of beef cattle by-products / B.A. Stewart, C.A. Robinson, and David B. Parker -- Liquid dairy manure utilization in a cropping system : a case study / Deanne Meyer and Lawrence J. Schwankl -- Beneficial use of poultry by-products : challenges and opportunities / Miguel L. Cabrera and J. Thomas Sims -- Beneficial uses of swine by-products : opportunities for the future / Robert L. Mikkelsen -- Examples and case studies of beneficial reuse of municipal by-products / Nicholas T. Basta -- Beneficial uses of flue gas desulfurization by-products : examples and case studies of land application / Warren A. Dick .. [et al.] / Properties and examples of beneficial use of gypsumlike by-products / K.D. Ritchey .. [et al.] -- Beneficial use of wood ash as an agricultural soil amendment : case studies from the United States forest products industry / Eric D. Vance and Charles C. Mitchell -- Beneficial reuse of aggregate mineral fines and scrap new construction wallboard / R.F. Korcak, R. Meininger, and Peter A. Yost -- Case studies of municipal and on-farm composting in the United States of America / Lawrence J. Sikora and Dan M. Sullivan.

*Descriptors:* land application/ agricultural by-products/ industrial by-products/ municipal by-products  
This citation is from AGRICOLA.

**1340. Manipulating nitrogen release from nitrogen-rich crop residues using organic wastes under field conditions.**

Chaves, B.; Neve, S. de; Boeckx, P.; Cleemput, O. van; and Hofman, G. *Soil Science Society of America Journal* 71(4): 1240-1250. (2007)

*NAL Call #:* 56.9 So3; ISSN: 0361-5995

*Descriptors:* carbon nitrogen ratio/ cauliflowers/ cereal byproducts/ composts/ crop residues/ denitrification/ green manures/ leaching/ mineralization/ nitrate/ nitrogen/ nitrogen content/ organic amendments/ organic wastes/ paper mill sludge/ release/ sawdust/ silt loam soils/ soil types/ straw/ Capparales/ heading broccoli

*Abstract:* Following mineralization of N-rich crop residues, large amounts of mineral N can be released into the soil. Manipulating N mineralization of crop residues may be an option to reduce NO<sub>3</sub> in soil. The potential to manipulate the N release from vegetable crop residues by using organic wastes was tested under field conditions on a silt loam soil of East Flanders (Belgium). At the start of the experiment, cauliflower (*Brassica oleracea* var. botrytis) residues (~73 Mg fresh matter ha<sup>-1</sup>) together with an immobilizer waste (~5 Mg C ha<sup>-1</sup> of straw, green waste compost, sawdust, or paper sludge) were incorporated into a silt loam soil. After 154 days, a remineralizing waste (~1 Mg C ha<sup>-1</sup> of vinasse or dairy sludge) was incorporated. During the field experiment, the mineral N content in the soil was measured at regular time intervals, and net N release, NO<sub>3</sub> leaching, and denitrification were simulated using a N mineralization-

immobilization model coupled to a NO<sub>3</sub> leaching model. Straw, green waste compost, and sawdust were able to immobilize between 54 and 68% of the N released by the cauliflower residues and reduced NO<sub>3</sub> leaching by 56 to 68%. Paper sludge released an extra amount of N due to its low C:N ratio. No consistent remineralization of N could be found in any of the treatments, probably due to an unsuitable composition of the remineralizer wastes. Manipulating N release of N-rich crop residues by using organic wastes may be a suitable method to reduce NO<sub>3</sub> leaching; however, stimulating remineralization of immobilized N by the start of the following spring may not be easy to achieve. Reproduced with permission from the CAB Abstracts database.

**1341. Mixtures of paper mill sludge, wood chips, bark, and peat in substrates for pot-in-pot shade tree production.**

Chong, C. and Lumis, G. P.  
*Canadian Journal of Plant Science* 80(3): 669-675. (2000)  
 NAL Call #: 450 C16; ISSN: 0008-4220  
*Descriptors:* bark/ diameter/ girth/ growing media/ organic wastes/ paper mill sludge/ peat/ plant height/ planting stock/ porosity/ shade trees/ trees/ trunks/ waste utilization/ wood chips/ woody plants/ nursery plants/ nursery stock/ Oleales/ planting materials/ potting composts/ rooting media  
*Abstract:* There is little scientific information on substrates for pot-in-pot shade tree production. The objective of this research was to examine various organic-waste-derived substrates for growing shade trees in pot-in-pot systems. Two-year-old seedling whips of green ash (*Fraxinus pennsylvanica*), one-year-old Japanese birch (*Betula platyphylla* var. *japonica*) and one-year-old silver maple (*Acer saccharinum*) were grown for 2 seasons (1994 and 1995) in 76-litre containers. The containers were trickle irrigated and fertilized with controlled-release fertilizers. Treatments included a control nursery mix (50% by volume of pine bark:15% compost:35% topsoil) and 9 other mixes classified into 3 groups: Group I (25, 50 or 75% bark mixed with 50, 25 or 0% wood chips, and 25% paper mill sludge); Group II (25, 50 or 75% bark; 50, 25 or 0% wood chips; and 25% peat); and Group III (25, 50 or 75% peat; 50, 25 or 0% wood chips; and 25% paper mill sludge). In both years, trunk diameters of the 3 species were greatest with Group III substrates, intermediate with Group II, and least with Group I. Trunk growth was positively correlated with water retention porosity, which ranged from 42 to 57%, 38 to 42%, and 20 to 27% for Groups III, II and I, respectively. Trunk diameters of Group I were significantly less, those of Group II were similar, and those from Group III substrates consisting of 75% peat (all three species) or 50% peat (birch and silver maple) slightly exceeded those of the nursery mix. The nursery mix had a water retention porosity of 49% and generally the highest content of soluble salts. The high-peat (50 and 75%) substrates marginally but consistently produced trees with the largest trunk diameters, although with birch (not the other species), shorter trees resulted as the peat content increased. Reproduced with permission from the CAB Abstracts database.

**1342. Re-use of waste paper and the mixture of it with some secondary woody and vegetable wastes as base substrata in the cultivation of *Pleurotus ostreatus* Jacq ex Fr Kummer: Atk kagtlarn cesitli bitkisel ve odunsu atk/ark substratlarla *Pleurotus ostreatus* Jacq ex Fr Kummer kultivasyonunda degerlendirilmesi.**

Baysal, E.; Yalnkc, M. K.; Peker, H.; Colak, M.; Goktas, O.; Ozen, E.; and Colak, A. M.  
*Ekoloji cevre dergisi* 12(49): 12-16. (2003); ISSN: 1300-1361.  
*Notes:* Language of the text is Turkish.  
*Descriptors:* crop residues/ cultivation/ edible fungi/ growing media/ husks/ leaves/ mycelium/ poplars/ sawdust/ straw/ substrates/ waste management/ waste paper/ waste utilization/ wheat/ wheat straw/ yields/ hulls/ Lentinaceae/ Poriales/ potting composts/ rooting media

*Abstract:* This study was conducted to investigate the possibility of cultivating *Pleurotus ostreatus* on waste paper as a base substrata and using some secondary substrates such as: wheat straw, maize stalk, grass, clover [*Trifolium*], sawdust, hazelnut husk, hazelnut leaves, poplar leaves, linden leaves and waste tea leaves mixed with waste paper (1:1; 1:3; 3:1 weight:weight). Mycelia development period and mushroom yield of *P. ostreatus* on the substrate mixture were investigated. The fastest mycelia development was observed with 22.5 days on sole waste paper substrata. In general, waste paper mixed with waste tea leaves and clover gave the longer mycelia development period and the lower mushroom yield than other substrate mixtures. The highest mushroom yield (36.3%) was recorded on waste paper+sawdust (3:1). Waste paper mixed with other substrate (3:1) ratio gave better results for mycelia development and mushroom yield compared to the other substrate mixtures. Reproduced with permission from the CAB Abstracts database.

**1343. Relationship between N, P and K application and the growth of tomato seedlings sown in sawdust-enriched substrates.**

Sun ZhiQiang; Li ShengLi; and Zhang YanLing  
*Journal of South China Agricultural University* 25(1): 25-28. (2004); ISSN: 1001-411X  
*Descriptors:* application rates/ biomass/ calcium sulfate/ dry matter/ fly ash/ growth/ leaf area/ nitrogen fertilizers/ phosphorus fertilizers/ potassium fertilizers/ sawdust/ seedling growth/ seedlings/ soilless culture/ stems/ substrates/ superphosphate/ tomatoes/ vermiculite/ calcium sulphate/ phosphate fertilizers/ potash fertilizers  
*Abstract:* The effects of N, P and K fertilizers on the growth of tomato seedlings on a sawdust:vermiculite:fly ash (6:2:2) substrate were studied. Seedling growth was highly affected by N, P, and N x P interaction. The values of growth parameters (stem height and diameter, fresh weight, dry weight, leaf area, and good seedling index) increased linearly with the increase in the rates of N and P. The highest values of the aforementioned parameters were obtained with 2.4 kg CO(NH<sub>2</sub>)<sub>2</sub> + 29.5 kg Ca(H<sub>2</sub>PO<sub>4</sub>)<sub>2</sub>.H<sub>2</sub>O + CaSO<sub>4</sub>.H<sub>2</sub>O. N x P interaction also enhanced seedling growth, but the effects of P on seedling growth were dependent on the N rate. Seedling growth was adversely

affected by P at a low N rate, but was enhanced by P at a high N rate. K had no significant effect on seedling growth. Thus, in sawdust-enriched substrates, complete fertilizers can be substituted by N and P fertilizers. Reproduced with permission from the CAB Abstracts database.

**1344. Screening of organic biological waste products for their potential to manipulate the N release from crop residues.**

Chaves, B.; Neve, S. de; Hofman, G.; Boeckx, P.; and Cleemput, O. van

*Communications in Agricultural and Applied Biological Sciences* 68(3): 83-86. (2003); ISSN: 1379-1176

*Descriptors:* celery/ composts/ crop residues/ dairy wastes/ green manures/ leaching/ malting/ mineralization/ molasses/ nitrate/ nitrogen/ organic amendments/ organic wastes/ sawdust/ sludges/ straw/ tannins/ use efficiency/ vinasse/ Araliales/ tannic acid

*Abstract:* A systematic screening of several organic waste products for a potential either to slow down the nitrogen (N) release from crop residues, or to stimulate remineralization at a time when crop demand starts increasing again. To evaluate the efficiency of the first category organic waste products (cereal straw, green waste compost, sawdust, tannic acid, paper sludge) as immobilizers, the amount of N released by the control treatment 'soil + celery leaves' was subtracted from the amount of N released from the treatments amended with a particular first category waste product. The N amount released from a treatment amended with a particular second category waste products (molasses, vinasses, dairy sludge, malting sludge) minus the N amount released from the control treatments amended with water and minus the net N mineralization of the second category waste products, is the remineralization primed by the second category waste products. Results indicated that there is scope for manipulating the N release from crop residues rich in N by the addition of organic waste products, to reduce nitrate leaching risks, to better match crop N demand with soil N supply and to increase overall N use efficiency. Both the intensity of the immobilization and the time at which remineralization occurs seems to be manageable by the right choice of organic waste product.

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**1345. Screening organic biological wastes for their potential to manipulate the N release from N-rich vegetable crop residues in soil.**

Chaves, Barbara; De Neve, Stefaan; Boeckx, Pascal; Van Cleemput, Oswald; and Hofman, Georges

*Agriculture, Ecosystems and Environment* 111(1-4): 81-92. (2005)

*NAL Call #:* S601.A34 ; ISSN: 0167-8809

*Descriptors:* pollution assessment control and management/ soil science/ agrichemicals/ umbelliferae: angiosperms, dicots, plants, spermatophytes, vascular plants/ carbon to nitrogen ratio/ immobilizer waste/ remineralizer waste

*Abstract:* In a laboratory study, organic biological wastes (OBW) were screened for their potential to manipulate the N release from vegetable crop residues in two phases: an immobilization and remineralization phase. During the first phase, celery leaves (*Apium graveolens* L.) were mixed

with an immobilizer waste (straw, two green waste composts (GWC1 and GWC2), saw dust, paper sludge and tannic acid) in order to immobilize N released from crop residues. During the second phase, the treatments received a remineralizer waste (malting sludge, vinasses, molasses and dairy sludge) in order to stimulate remineralization of immobilized N. Straw showed the most pronounced N immobilization (on average 30.2 mg N kg<sup>-1</sup>). N immobilization with tannic acid, saw dust and GWC2 was slower and less pronounced (on average 16.4, 15.9 and 8.0 mg N kg<sup>-1</sup> respectively). GWC1 and paper sludge immobilized almost no N. Only when GWC1 was mixed with vinasses, remineralization was observed (up to 55.4 mg N kg<sup>-1</sup>) during a 30 days period. For all other remineralizers, positive priming effects were scarce and short-lived. Manipulating the N release of N-rich crop residues may be a suitable method to reduce the nitrate concentration in soil after incorporation of crop residues. Especially, easily decomposable waste materials (i.e. low lignin content) with a large C:N ratio seem to have a potential to immobilize N. However, stimulating remineralization of immobilized N seems not easy to accomplish. (c) 2005 Elsevier B.V. All rights reserved. © Thomson Reuters

**1346. Soil and by-product characteristics that impact the beneficial use of by-products.**

Barker, A. V.; Stratton, M. L.; and Rechcigl, J. E.

In: *Land Application of Agricultural, Industrial, and Municipal By-Products*; Series: Soil Science Society of America Book 6 .

Madison, USA: Soil Science Society of America Inc., 2000; pp. 169-213.

*Descriptors:* agricultural wastes/ animal manures/ application to land/ crop residues/ fly ash/ food processing/ industrial wastes/ organic wastes/ phosphogypsum/ pulp mill effluent/ refuse/ sewage sludge/ soil amendments/ soil biology/ soil chemical properties/ soil physical properties/ tannery waste/ waste utilization/ wastes/ wood ash/ wood residues/ chemical properties of soil/ farm wastes/ kraft mill effluent/ land application/ municipal wastes/ physical properties of soil/ trash

*Abstract:* The physical, chemical and biological properties of soil are summarized. Different types of wastes viz., agricultural, farm manures, food-processing byproducts, municipal solid wastes and industrial byproducts are described and their interactions with soil are discussed including cautions and benefits of land application. Reproduced with permission from the CAB Abstracts database.

**1347. Some living plants and some additional products useful as soil conditioners and in various technologies.**

Wallace, A.

New York, USA: Marcel Dekker Inc., 1998; pp. 463-510.

*NAL Call #:* S661.7.H35 1998

*Descriptors:* aquatic plants/ bitumen emulsions/ cement/ cover crops/ green manures/ gypsum/ humates/ latex/ mulches/ peat/ permeability/ plastics/ polyacrylamide/ polymers/ reviews/ seaweeds/ sewage sludge/ soil/ soil acidity/ soil conditioners/ soil physical properties/ sulfuric acid/ trees/ urea/ usage/ wetters/ wood ash/ woody plants/ zeolites/ ammonium laureth sulfate/ asphalt emulsions/ mulching materials/ physical properties of soil/ sulphuric acid/ wetting agents

*Abstract:* The use of living plants (living mulches, green manure and cover crops) as soil conditioners is reviewed. Their effects on soil acidity and water permeability are discussed and the ability of trees to stabilize soils is considered. The use of peat and sphagnum moss, wood ashes, humates from oxidized lignites, zeolites and related substances, soil wetting agents and water penetrants, seaweed products, gypsum, shredded rubber tires, sewage sludge, recycled plasterboard gypsum, plastic milk from waste plastic, bitumen (asphalt) emulsions, ammonium laureth sulfate, copolymer latexes and related products, cement-type forming products, dust suppressants, and water absorbing (gel) polymers, urea-sulfuric acid adducts, water-soluble polyacrylamide as soil conditioners is reviewed.

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**1348. Speciation and mobility of cadmium in straw and wood combustion fly ash.**

Hansen, H. K.; Pedersen, A. J.; Ottosen, L. M.; and Villumsen, A.

*Chemosphere* 45(1): 123-128. (2001)

NAL Call #: TD172 .C54; ISSN: 0045-6535

*Descriptors:* agricultural soils/ cadmium/ chemical speciation/ fly ash/ forest soils/ groundwater pollution/ leaching/ mineral uptake/ soil amendments/ straw/ wood chips

*Abstract:* Two fly ashes from biomass combustion have been analysed regarding cadmium speciation and mobility. A fly ash from straw combustion contained 10 mg Cd/kg dry matter, and ~50% of the cadmium was leachable in water. The possible main speciation of cadmium in this fly ash was CdCl<sub>2</sub>. If his fly ash is added to agricultural soil, there is a threat for groundwater contamination and plant uptake. A fly ash from wood chip combustion had 28.6 mg Cd/kg dry matter. In this fly ash, the cadmium was bound more heavily, with only small amounts of cadmium leaching in mild extractants. The possible speciation of cadmium in this fly ash was as oxide or as CdSiO<sub>3</sub>. Long-term effects and accumulation of cadmium could be a problem when this fly ash is added to agricultural or forest soils.

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**1349. Survey of wastes spread on land in the European Union.**

Gendebien, A. H.; Davis, R. D.; Brunet, H.; Orsi, C.; and Marmo, L. (Gargano, Italy.); pp. 243-248; 2001.

*Descriptors:* agricultural wastes/ application to land/ cement/ dredgings/ European Union/ food wastes/ industrial wastes/ paper mill sludge/ pollution/ pollution control/ slaughterhouse waste/ tannery waste/ textile industry/ waste disposal/ waste management/ wood residues/ Common Market/ EC/ EEC/ environmental pollution/ European Communities/ European Economic Communities/ farm wastes/ land application

*Abstract:* This paper presents some interim findings of a survey of landspreading of wastes in the European Union (EU). The survey began in December 1999 and was scheduled to run for one year. The work was funded by the Directorate-General Environment of the European Commission. It was the first comprehensive survey of

landspreading of wastes in the EU but excluded sewage sludge which is already well-documented. The survey covered industrial wastes from wood processing, food production, abattoirs, paper mills, cement works, tanneries, textile manufacture etc. as well as agricultural wastes and dredgings from waterways. The survey collected information on the quantities and quality of wastes spread on land through literature reviews and direct contact with relevant governmental organizations and departments, federations of the main industries relying on the land outlet, and landspreading contractors. The survey also noted the controls in place in the Member States (n=15) to ensure that landspreading practices are beneficial to agriculture and safe for the environment. Landspreading of wastes can be a beneficial, cost-effective and sustainable outlet and the survey was intended to indicate the extent to which these aims were achieved and whether EU-wide controls should be considered to ensure protection of the environment.

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**1350. Tomato plant growth and fruit quality as affected by substrates.**

Novo, A. A. C.; Fontes, P. C. R.; Silva, D. J. H. da; and Cecon, P. R.

*Bioscience Journal* 20(3): 75-82. (2004)

NAL Call #: 11 Ac82 QH301 .R485; ISSN: 1516-3725.

*Notes:* Original title: Crescimento do tomateiro e qualidade do fruto em diferentes substratos.

*Descriptors:* chemical composition/ coal/ composts/ crop quality/ dry matter accumulation/ fruits/ growing media/ growth/ leaves/ nitrogen/ pH/ plant composition/ plant height/ roots/ sand/ sawdust/ stems/ subsoil/ substrates/ tomatoes/ chemical constituents of plants/ hydrogen ion concentration/ potential of hydrogen/ potting composts/ rooting media

*Abstract:* Plant growth and fruit quality were evaluated in tomato (cv. Carmen) plants grown on unheated greenhouse soil (control) or in plastic bags containing organic compost + sand, organic compost + sand with a higher N content (by 50%), subsoil, 50% coal + 50% sawdust (v/v), or commercial substrate. The treatments did not have significant effects on plant height and fruit pH. Dry matter accumulation was greatest in fruits. The growth of leaves, clusters, stems, fruits and roots did not significantly vary among the treatments except coal + sawdust, on which plant growth was inferior. Fruit quality in terms of total soluble solids content was similar in plants grown on organic compost + sand, organic compost + sand with a higher N content, subsoil, and unheated greenhouse soil. Increasing the N content of organic compost + sand had no significant effects on the evaluated parameters.

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**1351. Trace element mobility and soil chemical changes following land application of pulp mill sludge and boiler ash.**

Goldemund, Herwig

Athens, GA, United States : University of Georgia, 2000.

*Notes:* Update: 200417

*Descriptors:* ash/ carbon/ dissolved materials/ effluents/ environmental effects/ experimental studies/ field studies/ geochemistry/ laboratory studies/ leaching/ lysimeters/ organic carbon/ sludge/ soils/ trace elements/ transport/ environmental geology/ Geochemistry of rocks, soils, and sediments

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**1352. Treatment of drainage water with industrial by-products to prevent phosphorus loss from tile-drained land.**

McDowell, R. W.; Sharpley, A. N.; and Bourke, W.

*Journal of Environmental Quality* 37(4): 1575-1582. (July 2008)

*NAL Call #:* QH540.J6; *ISSN:* 0047-2425.

*Notes:* In the special issue: the 4th USDA Greenhouse Gas Symposium Paper presented at the 4th USDA Greenhouse Gas Symposium "Positioning Agriculture and Forestry to meet the Challenges of Climate Change", February 6-8, 2007, Baltimore, Maryland.

*Descriptors:* drainage water/ water pollution/ water treatment/ pollution control/ phosphorus/ losses from soil/ industrial byproducts/ tile drainage/ sorption/ fly ash/ heavy metals/ dairy farming/ topsoil/ particulates/ slags/ metallurgy/ New Zealand

*Abstract:* Tile drained land with phosphorus (P)-rich topsoil is prone to P loss, which can impair surface water quality via eutrophication. We used by-products from steel and energy industries to mitigate P loss from tile drains. For each by-product, P sorption maximum (P<sub>max</sub>) and strength (k) were determined, while a fluvarium trial assessed P uptake with flow rate. Although two ash materials (fly ash and bottom ash) had high P<sub>max</sub> and k values, heavy metal concentrations negated their use in the field. The fluvarium experiment determined that P uptake with by-products was best at low flow, but decreased at higher flow in proportion to k. A mixture of melter slag (<10 mm) and basic slag (high P<sub>max</sub>, 7250 mg kg<sup>-1</sup>; and k, 0.508 L mg P<sup>-1</sup>) was installed as backfill in eight drains on a dairy farm. Four drains with greywacke as backfill were constructed for controls. The site (10 ha) had P-rich topsoil (Olsen P of 64 mg kg<sup>-1</sup>) and yielded a mean dissolved reactive P (DRP) and total P (TP) concentration from greywacke backfilled drains of 0.33 and 1.20 mg L<sup>-1</sup>, respectively. In contrast, slag backfilled drains had DRP and TP concentrations of 0.09 and 0.36 mg L<sup>-1</sup>, respectively. Loads of DRP and TP in greywacke drains (0.45 and 1.92, respectively) were significantly greater (P < 0.05) than those from slag drains (0.18 and 0.85, respectively). Data from a farm where melter slag was used as a backfill suggested that slag would have a life expectancy of about 25 yr. Thus, backfilling tile drains with melter slag and a small proportion of basic slag is recommended as an effective means of decreasing P loss from high P soils. This citation is from AGRICOLA.

**1353. Use of mulches and soil stabilizers for land reclamation.**

Norland, M. R.; Series: Agronomy Monograph 41

Madison, USA: American Society of Agronomy, 2000; pp. 645-666.

*Descriptors:* application methods/ application rates/ composts/ costs/ cover crops/ erosion/ green manures/ mulches/ peat/ plant residues/ reclamation/ reviews/ sawdust/ soil conditioners/ costings/ mulching materials

*Abstract:* The use of mulches and soil stabilizers to control soil erosion prior to the establishment of vegetation in land reclamation is reviewed. The benefits and uses of organic mulches, composts, and natural organic soil materials such as peat and mucks, sawdust, and recycled waste paper, are described. The use of green manures, cover crops and crop residues, and soil stabilizers are also mentioned. Mulch application methods including spreading/broadcasting by hand, pneumatic and hydraulic spreaders, liquid slurry application by sprinkler irrigation, manual and mechanical anchoring of mulch and chemical tackifiers are examined. Rates of mulch application for seed cover, erosion control and plant mulch are also discussed. The economics of adding mulches and soil stabilizers are considered.

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**1354. Willamette's agricultural land application program in South Carolina.**

Barfield, W. M. New Orleans, LA.); pp. 471-473; 2000.

*Descriptors:* bleached pulp/ boilers/ cost benefit analysis/ environmental engineering/ fly ash/ land fill/ paper and pulp mills/ agricultural lands/ contract hauler/ agricultural engineering/ agriculture/ bleached pulps/ boilers/ fly ash/ land fill/ paper mills

*Abstract:* Willamette's agricultural land application program in South Carolina is presented. The program objectives include no landfilling of by-products and maximization of landfill life. The permit requirements such as agronomic land application rates, storage offsets & time, application offsets, frequency of material analyses and documentation are discussed.

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**1355. Wood/sludge ash effects on white spruce seedling growth.**

Staples, T. E. and Rees, K. C. J. van

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*Descriptors:* alfisols / application rates/ application to land/ calcium/ electrical conductivity/ Luvisols/ magnesium/ nutrient uptake/ paper mill sludge/ phosphorus/ phytotoxicity/ seedling growth/ seedlings/ soil ph/ soil solution/ soil types/ wood ash/ land application/ sols lessives

*Abstract:* The disposal of wood ash and/or pulp and paper mill sludges is becoming increasingly more challenging as landfills are more difficult to site due to diminishing land availability and public opposition, as well as more costly to construct and operate because of increasingly stringent regulations. The most notable alternative to disposal that is receiving the attention of the forest industry is land application. The objective of this study, conducted in Saskatchewan, Canada, was to determine the influence of applying pulp mill wood/sludge ash mixture on: (1) various soil chemical properties of an orthic gray luvisol [Luvisols; Alfisols] and (2) the growth and nutrient uptake of white spruce (*Picea glauca*) seedlings. The pulp mill wood/sludge ash mixture from an olivine burner was surface broadcast at rates of 1 and 5 t ha<sup>-1</sup> around white spruce seedlings planted on disc-trenched microsites. Soil solutions from lysimeters and soil samples were analysed for exchangeable elements, soil pH and electrical conductivity while white spruce tissue samples were analysed for

various elements. Applications of pulp mill wood/sludge ash material significantly increased the soil pH from 4.8 to 6.9, resulting in increased soil extractable and soil solution P, Ca, and Mg. Soil electrical conductivity was increased from about 0.02 dS m<sup>-1</sup> to approximately 0.10 dS m<sup>-1</sup> by the heavier application rate of ash. In addition, at higher ash application rates, white spruce seedling growth was significantly decreased, suggesting salt phytotoxicity effects from the ash. These results indicate that with proper rate determination and management of salt effects, land application of this material would not appear to pose serious problems for white spruce seedling establishment. Reproduced with permission from the CAB Abstracts database.