

Used Tires

838. Assessment of macro and micro-nutrient accumulation in bermudagrass grown in crumb rubber amended media.

Owings, Allen D. and Bush, Edward W.

HortScience 36(3): 541. (2001)

NAL Call #: SB1.H6; ISSN: 0018-5345

Descriptors: macronutrients/ micronutrients/ bermudagrass/ crumb rubber

Abstract: A study was initiated by the Louisiana State Univ AgCenter to determine the influence of media incorporations of crumb rubber on accumulation of macro and micro-nutrients in leaf tissue of common bermudagrass (*Cynodon dactylon* L.). Vegetative growth influences were also measured. Common bermudagrass was established by seeding in 7.6 L containers filled with either 80% sand : 20% peat moss, 67.5% sand : 20% peat moss : 12.5% crumb rubber, 55% sand : 20% peat moss : 25% crumb rubber, or 42.5% sand : 20% peat moss : 37.5% crumb rubber. Increasing rates of crumb rubber in media significantly increased leaf tissue levels of N, K, Mn, and Zn. Levels of Zn and Mn exceeded optimum levels recommended for bermudagrass. There was no statistical difference in leaf tissue concentrations of P, Ca, Mg, Na, B, Cu, and Fe. Vegetative growth was decreased with increasing rates of crumb rubber in the media. Crumb rubber rates >12.5% (by volume) sharply reduced vegetative growth.

© Thomson Reuters

839. Drained and cushioned feed lot for livestock.

Pederson, Les

Official Gazette of the United States Patent and Trademark Office Patents 1227(3)(1999); ISSN: 0098-1133

Descriptors: feed lot / livestock/ waste tires

Abstract: A base for a feed lot composed of baled rubber material such as waste tires. The bales are placed beneath the surface of the feed lot and covered with earth. Any gaps between bales are filled with sand to provide for good drainage of the lot.

© Thomson Reuters

840. The ease of ignition of 13 landscape mulches.

Steward, L. G.; Sydnor, T. D.; and Bishop, B.

Journal of Arboriculture 29(6): 317-321. (2003); ISSN: 0278-5226

Descriptors: bark/ combustion/ fires/ ignition/ landscape/ mulches/ pine bark/ rubber/ straw/ mulching materials

Abstract: The ease of ignition of 13 commonly used landscape mulches was evaluated. Mulches have different ignition potentials based on several factors, including the length of exposure to heat and to the ignition source. Some materials ignited more frequently when exposed to a lit propane torch for 15 seconds. The most to least commonly ignited materials were ground rubber, pine straw, oat straw, shredded hardwood bark, shredded cypress bark, recycled pallets, 2.5 to 5 cm pine bark nuggets, 1.3 to 2.5 cm pine bark nuggets, shredded pine bark, cocoa shells, composted yard waste, bluegrass sod, and brick chips. Not all organic mulches readily ignited, nor were inorganic mulches uniformly ignition resistant. The results of this research show that there are definite differences in the ease of ignition between commonly used mulches. The results

demonstrate that landscapers do not have to resort to using inorganic materials such as brick chips and gravel for ignition-resistant mulches. Under high-temperature ignition, one inorganic material, ground rubber was ignited consistently and was difficult to extinguish. Conversely, there are organic materials that are unlikely to ignite. These also are maintenance practices that will prevent or reduce ignition of these mulches.

Reproduced with permission from the CAB Abstracts database.

841. Effect of free stall surface on daily activity patterns in dairy cows with relevance to lameness prevalence.

Cook, N. B.; Bennett, T. B.; and Nordlund, K. V.

Journal of Dairy Science 87(9): 2912-2922. (Sept. 2004)

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

Descriptors: dairy cows/ litter (bedding)/ posture/ lameness

Abstract: Differences in behavior of nonlame cows, slightly lame cows, and moderately lame cows in 6 free stall barns with sand bedding (SAND) vs. 6 free stall barns with rubber-crumb geotextile mattress surfaces (MAT) were documented in Wisconsin dairy herds. All lactating cows in the 12 herds were observed and given a locomotion score based on a 4-point scale: 1 = nonlame, 2 = slightly lame, 3 = moderately lame, and 4 = severely lame. Herd least square means +/- SE for prevalence of clinical lameness (locomotion scores = 3 and 4) were 11.1 vs. 24.0 +/- 1.7% for herds using SAND vs. MAT surfaces, respectively. Subsets of 10 cows per herd with locomotion scores of 1 to 3 were observed via video cameras for 24-h periods. Cows in MAT herds spent more time standing in free stalls per day than cows in SAND herds. Differences in standing times were 0.73 h/d for cows that were not lame, 2.32 h/d for cows that were slightly lame, and 4.31 h/d for cows that were moderately lame in MAT herds compared with equivalent cows in SAND herds. In MAT herds, the increase in time spent standing in the stall in moderately lame cows was associated with a significant reduction in stall use sessions per day, which impacted daily lying time. Although cause and effect are not clear, these findings have implications for housing, comfort, and care of cows in dairy herds with different types of free stall surfaces. This citation is from AGRICOLA.

842. The effects of crumb rubber topdressing on hybrid kentucky bluegrass and bermudagrass athletic fields in the transition zone.

Goddard, M. J. R.; Sorochan, J. C.; McElroy, J. S.; Karcher, D. E.; and Landreth, J. W.

Crop Science 48(5): 2003-2009. (2008); ISSN: 0011183X [CRPSA].

Notes: doi: 10.2135/cropsci2007.07.0405.

Descriptors: *Cynodon* (angiosperm)/ *Cynodon dactylon*/ *Cynodon transvaalensis*/ *Poa*/ *Poa arachnifera*/ *Poa pratensis*/ Poaceae

Abstract: New turfgrass varieties and management practices have introduced new options for transition zone athletic field managers. Our objectives were to determine the wear tolerance of four turfgrasses in the transition zone with and without crumb rubber under simulated athletic field conditions, and to determine if improved cool and warm-season turfgrass species can be used for transition zone

athletic fields. Field trials evaluated the use of four turfgrass species with and without crumb rubber topdressing in Knoxville, TN, and Fayetteville, AR. Experimental design was a randomized complete block with a split-strip plot treatment arrangement. Plots containing 'Thermal Blue' hybrid Kentucky bluegrass (*Poa pratensis* L. x *P. arachnifera* Torr.) or 'Riviera' [*Cynodon dactylon* (L.) Pers.], 'Quickstand' (*C. dactylon*), or 'Tifway' (*C. dactylon* x *C. transvaalensis* Burtt-Davy) bermudagrass were evaluated. Crumb rubber treatments were topdressed to achieve a 2-cm depth. Traffic was applied to each plot using a Cady Traffic Simulator to simulate athletic field wear. Traffic applications coincided with actual fall athletic seasons ranging from October to December 2005. Hybrid Kentucky bluegrass proved to be acceptable for use in transition zone athletic fields, Riviera and Tifway showed comparable wear tolerance, and Quickstand showed the lowest wear tolerance of the varieties tested. Crumb rubber topdressing resulted in a significant increase in turfgrass wear tolerance, and a decrease in surface hardness, soil bulk density, and shear resistance. © Crop Science Society of America.

© 2009 Elsevier B.V. All rights reserved.

843. An evaluation of crumb rubber and calcined clay for topdressing sports fields.

Miller, G. L.

Acta Horticulturae(783): 381-390. (2008)

NAL Call #: 80 Ac82; ISSN: 0567-7572

Descriptors: hardness / lawns and turf/ rooting capacity/ soil amendments/ soil compaction/ soil conservation/ soil strength/ soil texture/ soil types/ soil water content/ sports turf soils/ top dressings/ traction/ Bermuda grass/ lawns and sports turf/ soil quality

Abstract: Topdressing sports fields is used for to control thatch or to modify the soil surface. The use of coarse-textured materials for topdressing, other than traditional sand, has been suggested as a means of reducing compaction and minimizing wear. The objective of this study was to evaluate the effect of topdressing with coarse crumb rubber or calcined clay on a bermudagrass (*Cynodon dactylon*) turf subjected to intense traffic. Turf plots were topdressed with crumb rubber or calcined clay at 6, 11, or 17 mm depth each year for two years (25, 50, and 75 tonnes ha⁻¹ yr⁻¹) or with sand applied at 6 mm depth each year. The plots were subjected to cart wear and cleat damage during the study. Parameters evaluated included surface temperature, soil moisture, turf quality, traction, wear tolerance, recuperative ability, surface hardness, and rooting vigor. In this study, crumb rubber topdressing increased early season turf quality due to convection heating; whereas, calcined clay topdressing resulted in higher soil moisture but did not improve turf quality. High rates of crumb rubber or calcined clay reduced cleat traction 16 to 31% in 2000 and 23 to 29% in 2001, but resulted in reduced stand density when subjected to cart wear. Surface hardness was reduced in 2001 by crumb rubber topdressing 24% compared to apparent slight increases from sand (+1%) or calcined clay (+2%). Plots topdressed with sand showed the best turf surface toward the end of the season each year. This demonstrated that sand topdressing is generally a good cultural practice to maintain or improve turf quality. In these evaluations, the

crumb rubber and calcined clay provided some benefit, but not without some penalty to other parameters.

Reproduced with permission from the CAB Abstracts database.

844. An evaluation of mattresses and mats in two dairy units.

Chaplin, S J; Tierney, G; Stockwell, C; Logue, D N; and Kelly, M

Applied Animal Behaviour Science 66(4): 163-272. (2000); ISSN: 0168-1591

Descriptors: animal behaviour/ animal welfare/ behaviour/ body condition/ body weight/ cattle housing/ cows/ dairy cattle/ dairy cows/ feed intake/ feeding behaviour/ floors/ hygiene/ lameness/ litter/ locomotion/ mats/ milk composition/ milk quality/ milk yield/ somatic cell count/ trauma/ animal behavior/ animal rights/ behavior/ Britain/ cattle sheds/ feeding behavior/ flooring/ mattresses/ milk constituents/ traumas/ United Kingdom

Abstract: In order to investigate the relative merits of mats and mattresses in terms of cow comfort, production and performance, 29 cows were housed on ethylene vinyl acetate mats and 29 on mattresses of loose rubber crumb with a polypropylene cover, at each of 2 similar dairy units of the Scottish Agricultural College. Both mats and mattresses were newly installed at the start of the trial. The cows were housed in the autumn after calving. Milk yield was recorded daily. Cows were weighed and scored for body condition, locomotion, dirtiness and hock and knee injury at fortnightly intervals. Feed offered was recorded daily and refusals were weighed weekly. Monthly milk records of milk yield, milk composition and somatic cell count data were available for both herds. In addition, 24 h behavioural observations of 15 core cows in each group were made at weeks 0, 2, 4, 6, 8, 16, and 32 post-housing. There was no difference between cows on mats and mattresses in milk yield, composition or quality; in feed intake; in weight loss or body condition score; in severe hock or knee injury, or in the incidence of lameness. Cows on mattresses tended to have slightly higher total dirtiness scores than those on mats (7.06 vs. 6.95, $P=0.074$) and had dirtier udders (mattress, 7.50 vs. mat, 6.52, $P<0.05$). However, over the whole housing period, cows on mattresses spent longer feeding, ruminating and lying and a greater proportion of their lying time was spent ruminating. They spent less time standing doing nothing (idling) than cows on mats and less time idling in cubicles. Cows on mattresses appeared to adapt to housing more quickly than those on mats. Overall, neither mat nor mattress gave advantages in terms of production or performance, cows were slightly cleaner on mats but behavioural indices suggest that cow comfort was greater on mattresses.

Reproduced with permission from the CAB Abstracts database.

845. Foliar accumulation of zinc in tree species grown in hardwood bark media amended with crumb rubber.

Bush, E.; Owings, A.; and Leader, K.

Journal of Plant Nutrition 26(7): 1413-1425. (2003)

NAL Call #: QK867.J67 ; ISSN: 0190-4167

Descriptors: bark/ container grown plants/ foliar diagnosis/ forest nurseries/ growing media/ leaves/ ornamental plants/ pecans/ planting stock/ tyres/ waste utilization/ zinc/ foliage

diagnosis/ hickory nuts/ nursery plants/ nursery stock/ ornamentals/ planting materials/ potting composts/ rooting media/ tires/ tissue analysis/ United States of America
Abstract: Artificial nursery medium sources of uniformity and quality are becoming more difficult to locate. Alternative components such as recycled crumb rubber (CR) may have potential to be incorporated into bark or other growing media. Recycled CR is a waste product from automobile tyres. Mixtures of CR and hardwood bark were evaluated in production of container-grown trees in Louisiana, USA. Leaf tissue analysis revealed that linear or nonlinear increases in zinc (Zn) levels exceeded normal levels. Stem caliper, height, and quality of river birch (*Betula nigra* L.), pecan [*Carya illinoensis* (Wangenh.) C. Koch], and lacebark elm (*Ulmus parvifolia* Jacq.) decreased with increasing percentages of CR.
 Reproduced with permission from the CAB Abstracts database.

846. Foliar accumulation of zinc in tree species grown in pine bark media amended with crumb rubber.

Bush, E; Leader, K; and Owings, A
Journal of Plant Nutrition 24(3): 503-510. (2001)
 NAL Call #: QK867.J67 ; ISSN: 0190-4167 [JPNUDS]
Descriptors: *Betula nigra*/ *Ulmus parvifolia*/ *Carya illinoensis*/ nutrient content/ zinc/ soilless culture/ symptoms/ chlorosis/ application rate/ pine bark/ species differences
Abstract: Incorporated crumb rubber (CR) increased Zn tissue levels up to nine times the normal range in tree species. There was a linear increase in Zn tissue accumulation with increasing percentages of crumb rubber for river birch (*Betula nigra* L.), lacebark elm (*Ulmus parvifolia* Jacq.), and pecan [*Carya illinoensis* (Wangenh.) C. Koch]. Pecan leaves containing high levels of Zn exhibited no visual symptoms, unlike the remaining tree species exhibiting leaf chlorosis. Results suggest that crumb rubber incorporated at rates greater than 25% may cause abnormally high concentrations of Zn to accumulate in plant tissue.

This citation is from AGRICOLA.

847. Hock injuries in cattle kept in straw yards or cubicles with rubber mats or mattresses.

Livesey, C. T.; Marsh, C.; Metcalf, J. A.; and Laven, R. A.
Veterinary Record: Journal of the British Veterinary Association 150(22): 677-679. (2002); ISSN: 0042-4900
Descriptors: heifers/ dairy cows/ animal injuries/ tires/ yards/ lesions/ mats/ cow housing/ hocks/ chopped tires/ straw yards
Abstract: Hock damage is one of the most common traumatic injuries suffered by dairy cows, but most hock injuries can be avoided. This study investigated the effect of housing system on the development of hock damage in first lactation Holstein heifers. After calving, 60 heifers were randomly allocated to either straw yards, cubicles with butyl rubber mats, or cubicles with mattresses filled with chopped tyres. The hocks of these heifers were examined at the first week after calving (week 1) and at weeks 6, 12, and 26 of lactation. Hock damage was scored as either 1 (hair loss only) or 2 (all other damage). Heifers housed in cubicles with mats had significantly worse lesions at week 26 than at week 1, whereas no change was observed in heifers housed in cubicles with mattresses, and heifers housed on straw had significantly lower lesion scores. Heifers with no

lesions at calving were significantly more likely to develop lesions when kept on mats than heifers kept on straw or mattresses. These data suggest that replacing mats with mattresses in cubicles can result in a significant reduction in traumatic hock injury.

Reproduced with permission from the CAB Abstracts database.

848. Immobilization of mercury(II) in contaminated soil with used tire rubber.

Meng, Xiaoguang; Hua, Zeai; Dermatas, Dimitris; and Wang, Wei Kuo Hsiu Yu
Journal of Hazardous Materials 57(1-3): 231-241. (1998)
 NAL Call #: T55.3.H3J6; ISSN: 0304-3894
Descriptors: mercury/ contaminated soil/ used tire rubber
Abstract: The effectiveness of used tire rubber for immobilizing Hg(II) in a contaminated soil was evaluated using batch extraction and field rainwater leaching tests. The contaminated soil was prepared using a clay-loam spiked with mercury oxide or mercury chloride to yield a Hg(II) content of 300 mg/kg. When the contaminated soil was treated with 4% of tire rubber, Hg(II) concentration in an acetic acid leachate was reduced from 3500 ppb down to 34 ppb. Hg(II) concentration in the initial rainwater leachate was reduced from 84 ppb for untreated soil to 1.2 ppb for the rubber-treated soil. After 8 months of rainwater infiltration in the field, Hg(II) concentration decreased to less than 0.2 ppb for the treated soil. The rubber-treatment inhibited the evolution of metallic Hg⁰ from the spiked soil samples possibly by retarding the reduction of Hg(II) to Hg⁰. Batch extraction and adsorption results indicated that the rubber had high adsorption capacity for Hg(II) when pH values were between 2 and 8.

© Thomson Reuters

849. Measures for the protection of forest resources of small farmers: Reclamation and conservation of degraded soils.

Mario Pinto, Q.; Rodrigo Azolas, P.; and Enrique Williams, R.
Documento Tecnico Chile Forestal 160: 1-12. (2004).
Notes: Original title: 160 edicion n degrees 310 documento tecnico medidas para la proteccion de los recursos forestales de pequenos productores/as recuperacion y conservacion de suelos degradados.
Descriptors: afforestation/ choice of species/ crop residues/ cropping systems/ dams/ degraded land/ ditches/ drainage channels/ dykes/ eroded soils / erosion/ erosion control/ fences/ forest soils/ freshwater structures/ ground cover/ infiltration/ mulching/ reclamation/ revegetation/ ridging/ runoff/ scarification/ small farms/ soil conservation/ soil degradation/ subsoiling/ techniques/ terracing/ walls/ dikes/ eroded sites/ reafforestation/ reforestation
Abstract: The widespread occurrence of eroded soils in Chile, where 46.8% of the land (34,490,800 ha) is affected, is discussed and the causes and types of erosion involved outlined. The methods that can be used to recuperate and restore these soils are briefly described under two main categories: vegetative ground cover achieved by using cover crops and harvesting residues, and the use of suitable crops and cropping systems (including tree planting and forestry). Three schemes that offer economic incentives for protecting the soil are discussed: the INDAP (Instituto de Desarrollo Agropecuario), SAG (Servicio Agrícola y Ganadero) and CONAF (Corporacion Nacional

Forestral) programmes for recuperation of degraded soils. The last part of the report discusses specific techniques that can be used to recuperate and improve degraded soils, including the construction of infiltration ditches, diversion canals to collect surface runoff and large volumes of water flow, dykes constructed using posts, gabion check dams, fences, low stone walls, fascines, containment fences made of used tyres, terracing (microterraces) with or without scarification, subsoiling with ridging and complementary biological techniques (planting herbaceous and shrubby species).
Reproduced with permission from the CAB Abstracts database.

850. Methods for assessing the cushioning performance of free-stall dairy cow synthetic beds.

Tierney, G. and Thomson, R.
Transactions of the ASAE 46(1): 147-153. (2003)
NAL Call #: 290.9 Am32T; ISSN: 0001-2351
Descriptors: compression/ cows/ dairy cows/ dairy farming/ deformation/ equipment performance/ litter/ mats/ methodology/ performance tests/ stability/ static tests/ stresses/ methods
Abstract: Cushioning in dairy cow synthetic bed materials is quantifiable in terms of compression force attenuation and stability, but animal observation trials aimed at finding the best materials are expensive and time-consuming. Finite element analysis (FEA) is a computational technique used for engineering stress and deformation analysis. Accelerometric testing is used in sports engineering to test the cushioning offered by athletics tracks and synthetic sports surfaces. In the current work, these two methods were used to study the cushioning performance of two of the most commonly used types of free-stall or cubicle synthetic bed, rubber-crumb mattresses and ethylene vinyl acetate (EVA) mats, both of which are classified in engineering terms as hyperfoams. That is, materials that can undergo large deformations under load and yet return to their original shape on unloading. FEA was used, in conjunction with quasi-static compression force tests, to assess free-stall bed cushioning during the getting-up movement of a cow (a quasi-static "push") and to predict, in a quick and cost-effective way, variation in performance in time or as a result of an altered bed specification. The force-deflection responses of the materials of the two bed types were closely matched in the ABAQUS FE code, giving confidence in the ability of the model to predict the effect of changes in, for example, bed thickness and density. Accelerometric testing was used for the assessment of two further performance criteria vital to a bed purchase decision: first, the impact absorption performance during the lying down movement of a cow (a dynamic "drop"), and second, variation in cushioning performance over time as a result of the bed being used by a herd for three years. The quasi-static testing and FEA showed that a new rubber-crumb bed was more compliant than a new EVA bed and would therefore be more likely to prevent knee pain during the getting-up movement. The peak acceleration results showed that the new-condition rubber-crumb bed cushioned a cow knee impact force from a lying down movement best. However, the test of the three-year-old rubber crumb bed showed it to be less compliant compared to the new condition ($p < 0.001$). The EVA bed peak acceleration results also showed cushioning performance to be poorer after three years of use

($p = 0.007$), although the data showed a less stark change compared to that for the rubber-crumb beds. The observed use-related reduction in cushioning performance of the rubber-crumb bed was simulated in ABAQUS by reducing the model thickness by 50% and looking at the force-deflection response.
Reproduced with permission from the CAB Abstracts database.

851. Modification of clayey soils using scrap tire rubber and synthetic fibers.

Akbulut, S.; Arasan, S.; and Kalkan, E.
Applied Clay Science 38(1/2): 23-32. (2007)
NAL Call #: TA455.C55 ; ISSN: 0169-1317
Descriptors: compression/ fibres/ modification/ polyethylene/ properties/ reinforcement/ research/ shear/ soil / wastes/ fibers/ polythene/ studies
Abstract: A number of studies have been conducted recently to investigate the influence of randomly oriented fibres on the geotechnical behaviour of grained soils. However, very few studies have been carried out on fiber-reinforced clayey soils. Therefore, this experimental work has been performed to investigate the influence of randomly oriented fibre inclusion on the geotechnical behaviour of clayey soils. This research evaluates the use of waste fibre materials such as scrap tire rubber, polyethylene, and polypropylene fibre for the modification of clayey soils. This investigation focuses on the strength and dynamic behaviour of the reinforced soils with randomly included waste fibre materials. The unreinforced and reinforced samples were subjected to unconfined compression, shear box, and resonant frequency tests to determine their strength and dynamic properties. These waste fibres improve the strength properties and dynamic behaviour of clayey soils. The scrap tire rubber, polyethylene, and polypropylene fibres can be successfully used as reinforcement materials for the modification of clayey soils.
Reproduced with permission from the CAB Abstracts database.

852. Monitoring indices of cow comfort in free stall housed dairy herds.

Cook, N. B.; Bennett, T. B.; and Nordlund, K. V.
Journal of Dairy Science 88(11): 3876-3885. (2005)
NAL Call #: 44.8 J822; ISSN: 00220302
Descriptors: comfort index/ lameness/ stall use/ animal/ animal behavior/ animal housing/ animal lameness/ animal welfare/ body posture/ cattle/ dairying/ female/ lactation/ methodology/ physiology/ regression analysis/ statistical model/ time/ animal welfare/ animals/ behavior, animal/ cattle/ cattle diseases/ dairying/ female/ housing, animal/ lactation/ lameness, animal/ least-squares analysis/ linear models/ posture/ time factors
Abstract: Indices of cow comfort are used widely by consultants in the dairy industry, with a general understanding that they are representative of lying behavior. This study examines the influence of stall base type (sand or a geotextile mattress filled with rubber crumbs) and time of measurement on 4 indices of comfort collected at hourly intervals in 12 herds, aligned by morning and afternoon milking. Stall base type significantly influenced all indices of comfort. For example, the least squares mean (SE) cow comfort index (proportion of cows touching a stall that are lying down) was 0.76 (0.015) in

herds with mattresses compared with 0.86 (0.015) in herds with sand stalls. Significant hourly variation was also identified suggesting that timing of measurement is important. None of the indices of cow comfort derived from the high-yielding group pen was associated with the mean 24-h lying time of 10 sentinel cows whose time budgets were known in each herd. However, the cow comfort index was associated with the herd mean 24-h stall standing time, with the strongest relationships occurring 2 h before the morning and afternoon milking, when stall base type did not significantly influence the association. When measured at these times, we recommend use of the stall standing index (proportion of cows touching a stall that are standing), with values greater than 0.20 being associated with abnormally long herd mean stall standing times greater than 2 h/d. © American Dairy Science Association, 2005. © 2009 Elsevier B.V. All rights reserved.

853. Physical characteristics of sports turf rootzones amended and top dressed with rubber crumb.

Baker, S. W.; Hannaford, J.; and Fox, H.
Journal of Turfgrass Science 77: 59-70. (2001); ISSN: 1367-8361

Descriptors: application rates/ bulk density/ capillary capacity/ golf courses/ golf green soils/ hydraulic conductivity/ lawns and turf/ porosity/ rhizosphere/ sandy soils/ shear strength/ soil amendments/ soil density/ soil physical properties/ soil strength/ soil types/ top dressings/ waste utilization/ wastes/ lawns and sports turf/ physical properties of soil

Abstract: The physical properties of sand-soil root zones were examined after the incorporation of rubber crumb. Four size grades of rubber crumb were either mixed into the root zone at rates varying from 0-50% by volume or applied on the surface, with depths ranging from 0-20 mm. The hydraulic conductivity of mixes containing rubber crumb tended to increase, especially when incorporation rates exceeded 30% (v/v). Hydraulic conductivity was greatest when medium grades (0.25-1.5 mm) of rubber crumb were used. With coarser grades of rubber crumb, it was thought that significant interpacking took place between the rubber crumb and the root zone mix. Bulk density decreased as the incorporation rate of rubber crumb increased and bulk density values were greater for the coarser grades of rubber crumb (1-3 mm or 2-8 mm material). Total porosity decreased with incorporation rate for the coarser grades of rubber crumb but was hardly affected by fine (0.125-1.0 mm) and medium grade material. Capillary porosity decreased with incorporation rate and finer crumb size, while air-filled porosity was greatest where medium grade material was used. Increasing rates of rubber crumb reduced surface hardness and shear strength. When used as a top dressing material, increasing depth of rubber crumb caused increases in total porosity and air-filled porosity and decreases in bulk density, capillary porosity, hardness and shear strength. The effects of crumb grade were generally not significant, although for hydraulic conductivity values decreased with depth for fine grade material. The use of rubber crumb gave advantages of increased hydraulic conductivity and reduced bulk density and hardness. However, the consequences of large quantities of rubber crumb on water retention and surface stability must be considered. In

general, medium grade rubber crumb (0.5-1.5 mm) appeared to be the most effective for use with sand-dominated root zones.

Reproduced with permission from the CAB Abstracts database.

854. Recycled rubber topdressing improves wear tolerance in athletic turfgrass.

Gazze, Christopher and Walter, Cynthia
Journal of the Pennsylvania Academy of Science 81(2-3): 47-52. (2008); ISSN: 1044-6753

Descriptors: recycled rubber/ topdressing/ wear tolerance/ athletic turfgrass

Abstract: Late summers in southwestern Pennsylvania are characterized by hot, dry weather, which impedes the ability of athletic turf to tolerate wear, therefore decreasing the safety and performance of the field. Crumb rubber made from discarded tires may play an important role in protecting grass from the harmful effects of wear. A study was performed in summer, 2005 to determine the effect of crumb rubber (CR) topdressing on the wear tolerance of a newly established athletic turf. A field was planted in May in Greensburg, PA, Westmoreland Co., using Kentucky bluegrass (*Poa pratensis*) sod treated with combinations of CR topdressing and wear that simulated football practice in August. In most measures of turf quality, results from three replicate plots/treatment in a randomized block design confirmed the expected pattern of progressively decreasing performance in the following treatment groups: no wear with CR, no wear without CR, wear with CR, wear without CR. The CR and wear factors had statistically significant effects on turf coverage and several aspects of grass biology (two factor ANOVA, p values \leq 0.01). Our results suggest that CR can increase the wear tolerance of a new athletic field used in late summer, and potentially improve the quality of the playing surface for athletes.
© Thomson Reuters

855. The role of finite element analysis in predicting the injury-reduction potential of dairy cow cubicle synthetic beds.

Tierney, G. and Thomson, R. D.
Journal of Agricultural Engineering Research 80(4): 373-379. (2001)

NAL Call #: 58.8 J82; ISSN: 0021-8634

Descriptors: cows/ cubicles/ dairy cows/ finite element analysis/ injuries/ litter/ mats/ prediction/ stress analysis
Abstract: The optimum degree of cushioning in dairy cow cubicle synthetic bed materials is a compromise between impact force attenuation and stability. Farm trials aimed at finding the best materials are expensive but finite-element analysis, a computational method routinely used for engineering stress analysis, is now able to model the deformation of foam-like cubicle bedding materials under loads induced by a kneeling cow. It thus offers the potential for predicting cushioning performance for less cost. This paper compares finite-element analyses of two types of cubicle bed, recycled rubber-crumbs mattresses and ethylene vinyl acetate mats, the properties of which were derived from simple laboratory experiments, with results from a two-farm study of cow injury assessments. The bed samples were subject to quasi-static compression tests and their force-displacement responses were measured. Both

samples were found to be non-linear elastic, with a response that may be characterized as hyperelastic. While both products would provide sufficient cushioning to reduce severe hock and knee injuries, the rubber-crumb mattress was the more compliant of the two and should result in fewer injuries to the cows. These inferences were substantiated by the two-farm study. This allows a practical 'injury prevention performance rating' to be investigated. Reproduced with permission from the CAB Abstracts database.

856. The role of finite element analysis in predicting the short-term and long-term injury-reduction potential of dairy cow cubicle synthetic beds.

Tierney, G. and Thomson, R.

In: 2000 ASAE Annual International Meeting, Technical Papers: Engineering Solutions for a New Century. Milwaukee, WI.; Vol. 2.; pp. 4067-4074; 2000.

Descriptors: dairy cow cubicle beds/ impact loading/ injury prevention/ innovative use of finite element analysis/ attenuation/ computational methods/ deformation/ elastic moduli/ finite element method/ foams/ loads (forces)/ mathematical models/ rubber/ stress analysis/ hyperfoams/ impact loading/ injury prevention/ recycled rubber crumbs (rrc)/ dairies

Abstract: Cushioning in dairy cow cubicle synthetic bed materials is quantifiable in terms of impact force attenuation and stability but trials aimed at finding the best materials are expensive and time-consuming. Finite Element Analysis (FEA), a computational technique used for engineering stress and deformation analysis, can be used to model the deformation of cubicle bedding under loads induced by a kneeling cow. Synthetic beds made from recycled rubber crumbs (RRC) or from ethylene vinyl acetate (EVA) are classified in engineering terms as hyperfoams, i.e. materials that can undergo large deformations under load and yet return to their original shape on unloading. The mechanical behaviour of hyperfoams is difficult to predict by manual calculation but the Abaqus FE code can model them in terms of engineering properties such as the initial shear modulus, μ and the hyperelastic power-stiffening index, a . Suitable values for these properties were derived by matching FE analyses with compression test results and the role of FEA in determining a practical 'injury prevention performance rating' was investigated.

© 2009 Elsevier B.V. All rights reserved.

857. Rootzone mixes amended with crumb rubber: Field study.

Boniak, R.; Chong, S K; Ok, C H; and Diesburg, K L

International Turfgrass Society Research Journal 9: 487-492. (2001)

Descriptors: Alfisols / clay loam soils/ hardness/ lawns and turf/ porosity/ rhizosphere/ rubber/ seed germination/ soil amendments/ soil compaction/ soil types/ soil water content/ tilth/ top dressings/ tyres/ Festuca elatior/ lawns and sports turf/ tires/ United States of America

Abstract: The objective of this study was to evaluate the quality and performance of turf established on root zone amended with crumb rubber in a fine-textured soil. The field experiment was conducted using a randomized complete block design at the Horticulture Research Centre, Southern Illinois University Carbondale, USA. The soil was classified as a Hosmer silty clay loam (fine-silty, mixed, mesic Typic

Fragiudalfs). Three different grades (average 3.5, 6.5 and 9.5 mm) of crumb rubber shredded from used tyres were added to soil for the purpose of enhancing its tilth. The amounts of crumb rubber (treatment) amended in soil were 0.2, 0.3 and 0.4 g g⁻¹. In addition, a zero amendment (as a control) and a zero amendment with 6.5 mm crumb rubber top dressing were included for comparison. The grass used in the test was a tall fescue (*Festuca arundinacea* 'Pyramid') and bluegrass (*Poa pratensis* 'Raven') (90:10) mix. Parameters measured include germination rate, grass clipping weight, turf quality index, root mass, soil moisture content and surface hardness. Poor germination rates were observed in mixtures with 0.3 and 0.4 g g⁻¹ amendment rates of 3.5 mm crumb rubber. Results indicated that soil mixtures with 6.5 mm crumb rubber at 0.2 g g⁻¹ amendment rate recorded the highest clipping yields, but no statistical difference in turf quality was observed between the control and 0.2 g g⁻¹ of 6.5 mm treatments. Reproduced with permission from the CAB Abstracts database.

858. Rootzone mixes amended with crumb rubber: Laboratory study.

Chong, S. K.; Ok, C. H.; Boniak, R.; and Diesburg, K. L.

International Turfgrass Society Research Journal 9: 493-497. (2001)

Descriptors: Alfisols / clay loam soils/ Entisols/ growth/ hydraulic conductivity/ lawns and turf/ porosity/ rhizosphere/ rubber/ silt loam soils/ soil amendments/ soil physical properties/ soil types / sports turf soils/ tilth/ tyres/ lawns and sports turf/ physical properties of soil/ tires

Abstract: The purpose of this research was intended to enhance the tilth of fine-textured soil for turf growth by incorporation of crumb rubber shredded from used tyres. The specific objectives were to determine the physical properties of soil mixtures amended with different grade and amount of crumb rubber. Two soils and three different grades (3.5, 6.5 and 9.5 mm) of crumb rubber were used in this study. The soils selected were an Arenzville silt loam (coarse-silty, mixed, nonacid, mesic Typic Udifluvents) and a Hosmer silty clay loam (fine-silty, mixed, mesic Typic Fragiudalfs). The amount of crumb rubber mixed in soil ranged from 0 to 0.4 g g⁻¹ (using 0.05 g g⁻¹ increments and 0 as control). For each treatment, soil cores were constructed following the recommendation by the United States Golf Association Green Section Record. Results indicated that porosity of the mixtures decreased as the amount of crumb rubber increased. Regardless of the grade of crumb rubber, mixtures with less than 0.15 g g⁻¹ of crumb rubber in fine-textured soil could not enhance their macroporosity and hydraulic conductivity. However, as the amendment increased over 0.15 g g⁻¹, the tilth of the mixtures had significantly improved compared with the zero treatment.

Reproduced with permission from the CAB Abstracts database.

859. Simulated traffic on turfgrass topdressed with crumb rubber.

Rogers, J. N. III; Vanini, J. T.; and Crum, J. R.

Agronomy Journal 90(2): 215-221. (1998)

NAL Call #: 4 AM34P; ISSN: 0002-1962

Descriptors: lawns and turf/ ornamental plants/ particle size/ rubber/ shear strength/ soil mechanics/ sports

grounds/ sports turf soils/ top dressings/ traffic/ engineering properties of soil/ lawns and sports turf/ mechanical properties of soil/ ornamentals/ playing fields/ United States of America

Abstract: Sand is commonly used for top dressing turfgrass subject to traffic; under suboptimal growing conditions, however, methods to maintain wear tolerance are limited. A top dressing study was initiated in July 1993 to determine the effect of crumb rubber from recycled tires on turfgrass systems subjected to simulated athletic field traffic. A factorial randomized complete block design with three replications was implemented with two crumb rubber particle sizes (large, 6.0-2.0 mm; small, 2.0-0.05 mm) and five top dressing rates (0.0, 17.1, 34.2, 44.1, and 88.2 t/ha) on a 1-year-old Kentucky bluegrass-perennial ryegrass (*Poa pratensis*-*Lolium perenne*) stand in Michigan, USA. In 1993 and 1994, 96 passes were made with a Brinkman traffic simulator. Surface hardness characteristics measured were peak deceleration, time to peak deceleration, and impact duration. The small crumb rubber size was more effective in increasing impact time periods than the large crumb rubber, but had no effect on peak deceleration values. Shear resistance values decreased by as much as 40% as crumb rubber volumes increased in 1993, but were increased by 20% in 1994 after rubber particles had settled to the soil surface. There was generally an increase in turf cover under traffic as crumb rubber rates increased above 34.1 t/ha, and the small crumb rubber was more effective in 1993. It is suggested that crumb rubber can alter surface characteristics and increase wear tolerance of turfgrass exposed to traffic. Reproduced with permission from the CAB Abstracts database.

860. State of the art free stall designs: Do they allow lame cows to maintain normal patterns of stall use?

Marin, S. M. J.; Schaefer, M. J.; Mentink, R. L. ; Banks, R. J.; Calderon, B. D.; and Cook, N. B.

In: American Society of Agricultural and Biological Engineers. 6th International Dairy Housing Conference 2007. Minneapolis, MN.; pp. 6-11; 2007. ISBN: 9781605600529

Descriptors: cow comfort/ lameness/ mattress/ sand/ agriculture/ housing/ American society/ biological engineers/ cow comfort/ dairy herds/ lameness/ mattress/ rubber crumb/ sand/ state of the arts/ time budgeting/ video analysis/ food products plants

Abstract: Time budgets for 59 mature Holstein cows were obtained using video analysis over a single 48 h period in 4 two-row free stall housed dairy herds, milked twice a day. Stall design differed only in stall base type with 2 herds with Pasture Mat® rubber crumb filled mattress stalls and 2 herds with Pack Mat™ stalls - consisting of 2 inches of sand over a mattress. Both stall base and locomotion score significantly influenced stall standing behavior. Lame cows on Pasture Mats lay for less than 12 h/d and stood in the stall in excess of 4 h/d. In contrast, while lame cows on Pack Mats maintained lying times at 13.1 h/d and stood in the stall for less than 2 h/d. The Pack Mat design appears to be very beneficial for lame cows, while Pasture Mat failed to allow lame cows to maintain normal patterns of stall usage. However, the addition of foam to improve surface cushion of the Pasture Mat appeared to improve stall use by both lame and nonlame cows in one herd.

© 2009 Elsevier B.V. All rights reserved.

861. Treatment of screened dairy manure by upflow anaerobic fixed bed reactors packed with waste tyre rubber and a combination of waste tyre rubber and zeolite: Effect of the hydraulic retention time.

Umaña, Oscar; Nikolaeva, Svetlana; Sánchez, Enrique; Borja, Rafael; and Raposo, Francisco
Bioresource Technology 99(15): 7412-7417. (Oct. 2008)
NAL Call #: TD930.A32; ISSN: 0960-8524

Descriptors: dairy manure/ anaerobic fixed bed reactors/ waste tires/ zeolite/ hydraulic retention time

Abstract: Two laboratory-scale anaerobic fixed bed reactors were evaluated while treating dairy manure at upflow mode and semicontinuous feeding. One reactor was packed with a combination of waste tyre rubber and zeolite (R1) while the other had only waste tyre rubber as a microorganism immobilization support (R2). Effluent quality improved when the hydraulic retention time (HRT) increased from 1.0 to 5.5 days. Higher COD, BOD, total and volatile solids removal efficiencies were always achieved in the reactor R1. No clogging was observed during the operation period. Methane yield was also a function of the HRT and of the type of support used, and was 12.5% and 40% higher in reactor R1 than in R2 for HRTs of 5.5 and 1.0 days, respectively. The results obtained demonstrated that this type of reactor is capable of operating with dairy manure at a HRT 5 times lower than that used in a conventional reactor. This citation is from AGRICOLA.

862. Turf root zone medium amended by waste crumb rubber and ecological responses of turfgrass.

Wang, LiLi; Zhao, ShuLan; Liu, Yuan; Lian, Fei; Teng, Meng; and Duo, LiAn

Bulletin of Botanical Research 27(2): 233-237. (2007);
ISSN: 1673-5102

Descriptors: clay soils/ growth/ lawns and turf/ loam soils/ plant ecology/ roots/ rubber/ sand/ size/ soil amendments/ soil types/ lawns and sports turf

Abstract: Turf media were respectively compounded by loam, clay soil, sand and waste crumb rubber with four different sizes as soil amendment, and ecological responses of turfgrass were investigated. Analysis on the synthetic effect of all ecological indices showed that in the soil compounded media, compounded medium with 0.5- to 1.0-mm and 4.0- to 6.0-mm crumb rubber was better than those with 1.0-2.0 mm and 2.0-4.0 mm. However, compounded medium with 1.0- to 2.0-mm crumb rubber achieved better results in clay soil compounded media. Moreover, in sand compounded media, 1.0- to 2.0-mm and 2.0- to 4.0-mm crumb rubber was better than 0.5-1.0 mm and 4.0-6.0 mm. By comparison, from the angle of turfgrass growth, compounded medium with sand and waste crumb rubber as soil amendment had better prospects. Reproduced with permission from the CAB Abstracts database.

863. The use of crumb rubber as a container component for Lantana production.

Leader, Kris M.; Owings, Allen D.; and Bush, Edward W.
HortScience 33(4): 593. (1998)

NAL Call #: SB1.H6; ISSN: 0018-5345

Descriptors: crumb rubber/ used tires/ soil media/ Lantana/ flowering plant production

© Thomson Reuters

864. Utilisation of crumb rubber as a soil amendment for sports turf.

Groenevelt, P H and Grunthal, P E

Soil and Tillage Research 47(1/2): 169-172. (1998)

NAL Call #: S590.S48; ISSN: 0167-1987

Descriptors: aeration / amendments/ analysis/ compaction/ effects/ field tests/ lawns and turf/ metals/ physical properties/ porosity/ properties/ rubber/ soil/ sports turf soils/ statistics/ wastes/ lawns and sports turf

Abstract: A rubber crumb-based soil amendment can enhance the physical properties of soils susceptible to the negative effects of compaction. Highly compacted sports fields require constant aeration to maintain a healthy and safe playing surface. Rubber crumb adds resiliency to sports turf. Standard US Golf Association tests showed that admixtures containing 20% or less crumb rubber maintained recommended total porosity values. Field tests showed that 10-20% crumb rubber significantly reduced surface hardness. Analysis of metals, volatile organic compounds and base/neutral/acid extractable compounds from admixture leachate showed no deleterious effects to the environment due to inclusion of rubber crumb in turfgrass root zones.

Reproduced with permission from the CAB Abstracts database.

865. Utilization of waste tire chips as a cymbidium potting medium.

Kim JungEn; Choi SeongJin; and Kim HongYul

Journal of the Korean Society for Horticultural Science 41(4): 406-408. (2000)

NAL Call #: SB13.H28; ISSN: 0253-6498

Descriptors: growing media/ growth/ iron/ plant development/ tyres/ utilization/ zinc/ potting composts/ rooting media/ tires

Abstract: The physical and chemical characteristics of waste tyre chips, composed mainly of rubber and fibre, were analysed. Cymbidium plants were cultivated in media composed of various sizes of tyre chips. Water and nutrient holding capacity of tyre chips was lower than that of bark, but the growth of Cymbidium in tyre chips was equivalent to that in bark. Although Fe and Zn were present in leached water from tyre chips, heavy metals such as Cd and Pb were not detected and no serious injury symptoms were observed during cultivation of Cymbidium for 6 months in tyre chip potting media.

Reproduced with permission from the CAB Abstracts database.

866. Waste tire problem becomes opportunity for erosion control.

Anon.

Land Water 42(2): 36-39. (Mar. 1998-Apr. 1998); ISSN: 0192-9453

Descriptors: erosion control/ recycling/ solid wastes/ waste management/ used tires

Abstract: Numerous partners in Oklahoma have been turning the problem of waste tires into an opportunity. Many benefits have resulted by focusing on an alternative way to utilize the bulky waste, as opposed to how to dispose of it. The alternative: utilizing waste tires to control streambank erosion. In addition to saving valuable public and private land or property threatened by erosion, this option has other benefits. It provides a use for problem tires, has financial benefits, gives meaningful work to corrections inmates, and increases public awareness in the area of natural resource conservation and solid waste management.

Abstract reproduced from the Water Resources Abstracts database with permission from ProQuest LLC. © 2007 ProQuest LLC; all rights reserved. Further reproduction is prohibited without permission.