Irrigation Water Quality

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To locate a publication cited in this bibliography, please contact your local, state, or university library. If you are unable to locate a particular publication, your library can contact the National Agricultural Library (please see "Document Delivery Services" at http://www.nalusda.gov/ddsb).

Irrigation Water Quality

1. Accumulation of micronutrients and heavy metals by plants irrigated with sewage effluent.
   Sadik, M. K.; Ali, M. E.; Rabie, M. H.; Khalil, M. E. A.

   Includes references.
   Descriptors: citrus-; phaseolus-; lupinus-; irrigation-; sewage-effluent; trace-elements; heavy-metals; egypt-
   NAL Call No.: S599.5.A1A37-1991

2. Agricultural and munipal use of wastewater.
Bouwer, H.

Descriptors: refuse--; waste-water-treatment; water-reuse; irrigation-water; water-quality; quality-standards
NAL Call No.: TD420.A1P7
******************************************************************************

Karajeh, F. F.; Tanji, K. K.; King, I. P.

J-irrig-drain-eng v.120, p.363-381. (1994).
Includes references.
Descriptors: tile-drainage; drainage-water; eucalyptus--; roots--; uptake-mechanisms; agroforestry-systems; two-dimensional-flow; groundwater-level; soil-water; water-reuse; salinity--; water-management; seasonal-variation; mathematical-models; california--; root-water; san-joaquin-valley
NAL Call No.: 290.9-AM3Ps-IR
******************************************************************************

4. Agroforestry drainage management model. III. Field salt flow.
Karajeh, F. F.; Tanji, K. K.

J-irrig-drain-eng v.120, p.397-413. (1994).
Includes references.
Descriptors: tile-drainage; drainage-water; water-reuse; salinity--; agroforestry-systems; eucalyptus--; roots--; groundwater-level; two-dimensional-flow; gypsum--; irrigated-farming; mathematical-models; california--; san-joaquin-valley
NAL Call No.: 290.9-AM3Ps-IR
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5. Anaerobic/aerobic pretreatment of sugarcane mill wastewater for application of drip irrigation.
Yang, P. Y.; Chang, L. J.; Whalen, S. A.

Descriptors: sugarcane--; sugar-factory-waste; waste-water-treatment; aerobic-treatment; anaerobic-treatment; pretreatment--; water-reuse; irrigation-water; trickle-irrigation; organic-compounds; solid-wastes;
6. An analysis of changing constraints and planning for flexibility in a water reclamation program.
Bailey, H. E.; Moutes, J. G.; Schlesinger, F. D.

Descriptors: waste-water-treatment; water-reuse; irrigation-water; landscape-; irrigation-; urban-areas; california-
NAL Call No.: TD420.A1P7

7. An animal model to assess the potential for viral disease transmission from lawns irrigated with wastewater.
Deming, E. J.; Mote, C. R.; Von Bernuth, R. D.; Potgieter, L. N. D.

Includes references.
Descriptors: lawns-and-turf; irrigation-; waste-water; contamination-; porcine-enterovirus; pigs-; disease-transmission; animal-models; disease-models; human-diseases; infection-; risk-
NAL Call No.: TD172.J6

Rao Bhamidimarri, S. M.

Descriptors: meat-and-livestock-industry; industrial-wastes; waste-treatment; technology-; organic-fertilizers; organic-farming; water-reuse; irrigation- water; new-zealand; thermophilic-composting
NAL Call No.: TD420.A1P7

Niedrum, S. B.; Karioun, A.; Mara, D. D.; Mills, S. W.
Kelman, W. M.; Qualset, C. O.
Includes references.
Descriptors: triticum-aestivum; inbred-lines; line-differences; salt-tolerance; irrigation-water; saline-water; water-reuse; stress-response; genotype-environment-interaction; application-rates; nitrogen-fertilizers; genetic-variance; heritability-; crop-yield; grain-; harvest-index; dry-matter- accumulation; plant-breeding; california-
Abstract: Disposal of saline drainage water poses a difficulty in some cropping systems. This study investigated the reuse of such water for irrigating winter-planted spring wheat (Triticum aestivum L.) in the San Joaquin Valley of California. Uniform salinization with a controlled degree of salinity presents a new target cropping system for plant breeding. Our objectives were to measure genetic and environmental variance components for agronomic traits and stress susceptibility index (S), using 43 recombinant inbred lines (RILs) and their parents, 'Anza' and 'Cajeme 71', grown under three saline irrigation treatments (control, 0.6; intermediate, 7.0; and high, 14.0 dS m⁻¹) and two N fertilization rates (160 and 260 kg N ha⁻¹) in 2 yr. Soil water conductivities at harvest time were 1.2, 4.4, and 9.4 dS m⁻¹ (2 yr means) after the three irrigation treatments. Grain yield reductions after the 7.0 and 14.0 dS m⁻¹ treatments were 5 and 19% in the first year and 36 and 68% in the second year. In both years genetic variances were significant and genotype X environment interaction variances were not significant for grain and biomass yields and harvest index. Broad-sense heritabilities estimated each year were low for grain yield (0.30 and 0.10) and biomass (0.07 and 0.02). Differences in S, based on grain yields in the low and intermediate salinity treatments, were nonsignificant in both years among RIL, but indicated a higher salinity tolerance of Anza than Cajeme 71. It was suggested that selection in low salinity environments would produce cultivars with high yield potential for environments with moderate salinity stress (soil conductivity of approximately 7 dS m⁻¹), as may be prescribed with a controlled saline
irrigation cropping system for wheat.
NAL Call No.: 64.8-C883

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NAL Call No.: KP27.I5474-1991c

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NAL Call No.: TD420.A1P7

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13. Characterization and control of domestic wastewater in Bahrain: assessment of possible applications. Akhter, M. S.; Madany, I. M.

Includes references. Descriptors: waste-water; water-reuse; waste-water; treatment-; chemical-analysis; irrigation-water; groundwater-recharge; landscaping-; bahrain-
NAL Call No.: TD172.J6

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Akhter, M. S.

Descriptors: sewage-; waste-water-treatment; water-reuse; springs-water; chemical-analysis; water-quality; saline-water; irrigation-water; bahrain-
NAL Call No.: TD420.A1P7

Teltsch, B.; Juanico, M.; Azov, Y.; Ben Harim, I.; Shelef, G.

Descriptors: waste-water-treatment; water-reuse; irrigation-water; trickle-irrigation; water-quality; requirements-; filtration-; capacity-; water-pollution; particles-; control-methods; biological-techniques; freshwater-fishes; plankton-; concentration-; israel-; filter-clogging; screen-filters; hypophthalmichthys-molitrix
NAL Call No.: TD420.A1P7

Mahin, G. G.

Typescript.
Descriptors: Irrigation-water-Recycling; Alfalfa-Irrigation; Water-reuse-Research
NAL Call No.: NvU Thesis-2819

17. Comparison between chlorine dioxide and chlorine for use as a disinfectant of wastewater effluents.
Narkis, N.; Kott, Y.

Descriptors: refuse-; waste-treatment; effluents-; disinfection-; disinfectants-; comparisons-; water-reuse; irrigation-water; israel-
18. Contamination of lettuces with nematode eggs by spray irrigation with treated and untreated wastewater.
Descriptors: waste-water-treatment; infestation-; ascaridia-galli; ascaris-lumbricoides; water-reuse; irrigation-water; sprinkler-irrigation; lactuca-sativa; brazil-

19. Control of emitter clogging in drip irrigation with reclaimed wastewater.
Ravina, I.; Paz, E.; Sofer, Z.; Marcu, A.; Shisha, A.; Sagi, G.
Includes references.
Descriptors: emitters-; blockage-; performance-testing; trickle-irrigation; water-quality; irrigation-water; water-reservoirs; waste-water; water-reuse; chlorine-; chemical-treatment; filtration-; washing-; water-flow; discharge-; seasonal-fluctuations; clogging-susceptibility
Abstract: Experiments were carried out to evaluate the performance of various types of drip irrigation emitters, widely used in Israel, using waste water from a storage reservoir. Fine particulate matter agglomerated by microbial by products and in-line developed biomass were the principal clogging agents. Clogging fluctuated, increased as water quality deteriorated and decreased when it improved. There were definable differences between emitters of various types as to their clogging susceptibility which were not directly correlated with differences in emitter flow-rate, although, for any particular type, the emitter with smaller discharge was always more sensitive to clogging. The clogging process generally started with emitters located at the far end of the lateral and partial emitter clogging was more common than complete plugging. Overflow was also found in most emitter types and was more common in regulated emitters. Reliable long term operation of most emitter types was achieved with filtration at 80 mesh (180 micromoles opening) combined with daily chlorination and bimonthly lateral flushing. Regular lateral discharge monitoring was found to be a convenient way to detect the initiation of the clogging process. Chlorination was most efficient when applied before the emitters became massively clogged.
20. Creeping bentgrass damaged by low levels of atrazine in irrigation water.
Nus, J. L.; Sandburg, M. A.
Includes references.
Descriptors: agrostis-stolonifera-var; -palustris; lawns-and-turf; treatment-; atrazine-; irrigation-water; culture-; phytotoxicity-; application-rates; models- ; crop-quality; evaluation-
Abstract: Throughout the north-south climatic transition zone of the eastern United States, cool- and warm-season turfgrasses are used adjacently. A greenhouse study with creeping bentgrass (Agrostis palustris Huds.) was initiated to determine threshold concentrations of atrazine, an effective pre- and postemergence herbicide for warmseason turfgrasses, that would result in unacceptable levels of phytotoxicity to seedling and mature creeping bentgrass. Mature and 8-week-old seedling 'Penncross' creeping bentgrass were given 6.5 mm of daily irrigation of untreated water or water containing atrazine at 0.01, 0.02, 0.04, 0.08, 0.16, 0.32, 0.64, 1.28, or 2.56 mg.liter-1. A model of quality ratings taken 20 days after the initiation of treatments indicated threshold concentrations resulting in unacceptable turf quality to be approximately 0.05 and 0.08 mg.liter-1 for seedling and mature bentgrass, respectively.

Hadjivassilis, I.
Descriptors: dairy-industry; industrial-wastes; waste-water-treatment; water-reuse; activated-sludge; irrigation-water; cyprus-

22. The Dan Region sewage wastewater treatment and reclamation scheme.
Shelef, G.; Azov, Y.; Kanarek, A.; Zac, G.; Shaw, A.
In the series analytic: Water Quality International '94. 9. Special applications and emerging technologies; specific pollutants and treatment technologies; water reuse--industrial and municipal applications / edited by D. Ballay, T. Asano, R. Bhamidimarri, et al.
Descriptors: sewage-effluent; waste-water;
Brenner, A.; Shandalov, S.; Oron, G.; Rebhun, M.
In the series analytic: Water Quality International '94. 9. Special applications and emerging technologies; specific pollutants and treatment technologies; water reuse--industrial and municipal applications / edited by D. Ballay, T. Asano, R. Bhamidimarri, et al.
Descriptors: sewage-effluent; waste-water-treatment; biological-treatment; equipment--; filtration--; sand--; filters--; water-reuse; irrigation-water; israel--; sequencing-batch-reactors
NAL Call No.: TD420.A1P7

Adams, E. B.
Descriptors: water-quality; surface-water; groundwater--; drinking-water; irrigation-water; regulations--; quality-standards; contaminants--; washington--
NAL Call No.: 275.29-W27P

Jolis, D.; Campana, R.; Hirano, R.; Pitt, P.; Marinas, B.
Descriptors: water-reuse; desalinization--; waste-water; reverse-osmosis; reclamation--; water-purification; irrigation-water; irrigation--; applications--; california--
NAL Call No.: TD478.D4

DeHaan, D.; George, J. A.; Grabs, G.
27. Design methods for the development of wastewater land disposal systems.
Thoma, K.; Baker, P. A.; Allender, E. B.

Descriptors: waste-water; waste-disposal-sites; application-to-land; systems--; design--; industrial-wastes; irrigation--; eucalyptus--; forest-plantations; soil-pollution; south-australia
NAL Call No.: TD420.A1P7

Shuval, H. I.

Descriptors: waste-water-treatment; water-reuse; water-purification; irrigation-water; health-hazards; guidelines--; microbial-contamination; helminths--; water-quality; quality-standards; stabilization--; ponds--; who--; public-health; health-protection; water-pollution; control-methods; israel--; developing-countries
NAL Call No.: TD420.A1P7

29. Diagnostic evaluation of wastewater utilization in agriculture, Morelos State, Mexico.
Rodriguez Zavaleta, C.; Oyer, L.; Cisneros, X.

Includes references.
Descriptors: waste-water; waste-utilization; water-reuse; application-to-land; agricultural-land; irrigated-farming; ecosystems--; environmental-impact; land-productivity; sustainability--; mexico--; agroecosystems
NAL Call No.: S589.7.E57-1994

30. Direct and indirect water re-use.
31. Double reuse of citrus processing effluent for treatment and conservation.
Allhands, M. N.; Prochaska, J. F.
Descriptors: citrus-; waste-water; irrigation-; water-conservation; water-quality
NAL Call No.: 290.9-Am32P
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32. Dripper-clogging factors in wastewater irrigation.
Adin, A.; Sacks, M.
Includes references.
Descriptors: trickle-irrigation; irrigation-water; waste-water; effluents-; physicochemical-properties; blockage-; emitters-; filtration-
NAL Call No.: 290.9-AM3PS-IR
*****************************************************************************

33. Effect of effluent quality and application method on agricultural productivity and environmental control.
Oron, G.; DeMalach, Y.; Hoffman, Z.; Manor, Y.
Descriptors: households-; waste-water-treatment; effluents-; water-quality; waste-reuse; irrigation-water; trickle-irrigation; sprinkler-irrigation; food- crops; israel-
NAL Call No.: TD420.A1P7
*****************************************************************************

34. Effect of excess MgSO4 or Mg(HCO3)2 in irrigation water on corn growth.
35. Effect of selenite and selenate on plant uptake of cadmium by maize (Zea mays).
Includes references.
Descriptors: zea-mays; cadmium-; uptake-; irrigation-; translocation-; selenium-; pretreatment-; heavy-metals; toxic-substances; metabolic- detoxification; shoots-; roots-; phytotoxicity-; pot-experimentation; toxic-metals
NAL Call No.: RA1270.P35A1
*****************************************************************************

36. Effect of treated sewage water on vegetative and reproductive growth of date palm.
El Mardi, M. O.; Salama, S. B.; Consolacion, E.; Al Shabibi, M. S.
Includes references.
Descriptors: phoenix-dactylifera; irrigation-; irrigation-water; sewage-effluent; application-to-land; fruits-; leaves-; plant-composition; macronutrients-; trace-elements; nutrient-content; heavy-metals; uptake-; oman-
Abstract: The effect of treated sewage water on the vegetative and reproductive growth of date palms was assessed. Leaves and fruits samples were collected from locations irrigated with treated sewage (TSW), desalinated, and well water. Samples were analysed for their calcium (Ca), magnesium (Mg), iron (Fe), lead (Pb), copper (Cu), and zinc (Zn) content by atomic absorption spectrophotometry and for sodium (Na) and potassium (K) by flame photometry. The Mg, Fe, and Zn content of fruits and Na in the leaves were not found to be significantly different. Treated sewage water from University campus utilities significantly increased the Na, K, and Cu and reduced Ca in leaves and Zn in fruits of date palms. But no significant effect was observed on the K, Ca, Mg, and Na contents in fruits of the same palms. The different concentrations of Ca, Mg, Fe, and Zn in the fruits of date palms grown along the same TSW line were attributed to variations in the soil; however, those in Pb content of leaves could be attributed to motor vehicle combustion. The general trend indicated that fruits contained higher K, Na, and Fe contents, but lower Ca, Mg, Cu, Zn, and Pb contents.
than the leaves. Furthermore, leaves of date palms irrigated with desalinised and well water contained higher Ca and Zn, but lower K, Mg, Na, Cu, Fe, and Pb contents than those of palms irrigated with treated sewage water. Desalinised water reduced the K, Ca, Na, and Zn contents, but it increased the Mg, Fe, Cu, and Pb content of leaves compared to well water. None of the examined metal were found to reach toxic level to man or plant.

NAL Call No.: S590.C63

37. Effect of wastewaters on plant growth and soil properties.
Al Jaloud, A. A.; Hussain, G.; Al Saati, A. J.; Karimullah, S.

Includes references.
Descriptors: zea-mays; sorghum-bicolor; waste-water; irrigation-water; salinity--; biomass-production; dry-matter-accumulation; soil-salinity; exchangeable-sodium; sodium--; adsorption--; ratios--; waste-utilization; water-reuse; sodicity-
NAL Call No.: S592.17.A73A74

38. Effects of intermittent acidic irrigations on soybean yields and frogeye leaf spot.
Walker, J. T.; Philips, D. V.; Melin, J.; Spradlin, D.

Includes references.
Descriptors: glycine-max; cercospora--; microsphaera--; acid-deposition; irrigation-water; acidity--; irrigation--; phytotoxicity--; crop-yield; seeds--; plant-- composition; sulfur--; dry-matter-accumulation; susceptibility--; leaf-spotting; fungal-diseases; cercospora-sojina; powdery-mildew; microsphaera-diffusa
NAL Call No.: 450-R11

39. Effects of metsulfuron-treated water on some winter season crops.
Balyan, R. S.; Malik, R. K.

Supplement to Annals of applied biology, volume 122.
Descriptors: irrigated-stands; winter--; phytotoxicity--; metsulfuron--; irrigation-water; application-rates; india-
NAL Call No.: S587.T47

40. Effects of reclaimed wastewater on leaf and soil mineral composition and fruit quality of citrus.
Zekri, M.; Koo, R. C. J.

41. Effects of regenerant wastewater irrigation on growth and ion uptake of landscape plants.
Includes references.
Descriptors: hydrangea-macrophylla; nandina-domestica; athyrium-filix-femina; rhaphiolepis-indica; rosa-sempervirens; Pittosporum-tobira; jasminum- sambac; buxus-japonica; rhododendron--; irrigation-water; waste-water; waste-utilization; chloride--; ion-uptake; plant-composition; calcium--; potassium--; magnesium--; growth-rate; rhododendron--; formosa--; water-softeners
NAL Call No.: SB1.J66

42. Effects of salinity on growth and ionic composition of Coleus blumei and Salvia splendens.
Ibrahim, K. M.; Collins, J. C.; Collin, H. A.
Includes references.
Descriptors: coleus-blumei; salvia--; greenhouse-culture; irrigation-water; saline-water; sodium-chloride; concentration--; growth--; plant-analysis; sodium--; potassium--; ions--; selection-criteria; salt-tolerance
NAL Call No.: 80-J825

43. Effects on crops of irrigation with facultative pond effluent.
Monte, H. M. d.; Sousa, M. S.
Descriptors: refuse--; waste-water-treatment; lagoons--; effluents--; water-reuse; irrigation--; water--; crop-yield; crop-quality; portugal--
NAL Call No.: TD420.A1P7

44. Effluent reuse by trickle irrigation.
Oron, G.; DeMalach, Y.; Hoffman, Z.; Manor, Y.
45. Effluents quality along a multiple-stage wastewater reclamation system for agricultural reuse.
Azov, Y.; Shelef, G.

46. Enhanced transport of atrazine under irrigation with effluent.
Graber, E. R.; Gerstl, Z.; Fischer, E.; Mingelgrin, U.
was nonlinear, with a Freundlich n of 0.87 and a
distribution coefficient (Kf) of 1.07. The atrazine isotherm
in the presence of effluent had a similar n (0.86) but a
significantly lower Kf of only 0.93. Atrazine at a rate of 4
mg/kg-1 was added to soil columns filled with the < 1-mm size
fraction of the 0 to 30-cm horizon of soil from an
uncultivated site adjacent to the field site. Three replicate
columns were leached with 0.85 pore volumes of either
secondary effluent or 0.005 M CaCl2 solution at constant
head. Atrazine in the effluent-treated columns was more
strongly leached from the upper columns and peaked at higher
concentrations lower in the columns.
NAL Call No.: 56.9-So3

47. Environmentally sound agriculture through reuse and
reclamation of municipal wastewater.
Roberts, A.; Vidak, W.

Environmentally sound agriculture proceedings of the second
Includes references.
Descriptors: waste-water; waste-utilization; water-reuse;
application-to-land; agricultural-land;
environmental-protection; water-management; management-;
florida-; nutrient-management
NAL Call No.: S589.7.E57-1994

48. Evaluation of spray irrigation as a methodology for
on-site wastewater treatment and disposal on marginal soils.
Monnett, G. T. 1.
Vita.
Descriptors: Sprinkler-irrigation; Sewage-;
Land-treatment-of-wastewater
NAL Call No.: ViB1bV LD5655.V856-1992.M663

49. Evaluation of spray irrigation for on-site wastewater
treatment and disposal on marginal soils.
Monnett, G. T.; Reneau, R. B. Jr.; Hagedorn, C.

Includes references.
Descriptors: sewage-effluent; waste-water-treatment;
sewage-effluent-disposal; sprinkler-irrigation;
silt-loam-soils; water-quality; nitrogen--; nitrate--nitrogen;
ammonium-nitrogen; removal--; phosphorus--; soil-water-content;
application-to-land; virginia--; domestic-sewage-effluent;
individual-household-domestic-effluent
NAL Call No.: TD419.R47

50. Evaluation of the California wastewater reclamation
criteria using enteric virus monitoring data.
Asano, T.; Leong, L. Y. C.; Rigby, M. G.; Sakaji, R. H.

Descriptors: regulations-; refuse-; evaluation-; reclamation-; indicators-; enterovirus-; water-reuse; irrigation-water; california-
NAL Call No.: TD420.A1P7
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51. The Evaluation of water quality criteria for selenium, boron, and molybdenum in the San Joaquin River Basin.
University of California (System). Committee of Consultants on San Joaquin River Water Quality Objectives.

Cover title.
Descriptors: Water-Standards-California-San-Joaquin-River-Watershed-Evaluation; Water-quality-California-San-Joaquin-River-Watershed; Irrigation-water-California-San-Joaquin-Valley-Quality; Agricultural-pollution-California-San-Joaquin-Valley; Drainage-California-San-Joaquin-Valley
NAL Call No.: TD224.C2T43-1988
******************************************************************************

52. Fate of heavy metals in a land treatment system irrigated with municipal wastewater.
Yediler, A.; Grill, P.; Sun, T.; Kettrup, A.

Includes references.
Descriptors: waste-water; sewage-; sewage-effluent; application-to-land; oryza-sativa; irrigation-water; irrigation-; cadmium-; copper-; mercury-; lead-; zinc-; uptake-; roots-; leaves-; seeds-; liaoning-
NAL Call No.: TD172.C54
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53. Feasibility of cyclic reuse of saline drainage in a tomato-cotton rotation.

Includes references.
Descriptors: lycopersicon-esculentum; gossypium-hirsutum; rotations-; saline-water; drainage-water; water-quality; crop-quality; tomatoes-; crop-yield; soil-salinity; profiles-; boron-; selenium-; california-
Abstract: Use of saline drainage water for crop irrigation has been proposed as a strategy to reduce drainage volume and conserve good quality water. Over a 6-yr period, two cyclic drainage-water reuse practices were tested in a 3-yr rotation of processing tomato (Lycopersicon esculentum L.) and cotton (Gossypium hirsutum L.). In both practices, drainage water (ECi = 7.4 dS m-1 and 0.74 mmol L-1 B) was applied to processing tomato after first bloom to take advantage of salt-induced enhancement of fruit quality and increased crop salt tolerance at later developmental stages. In one practice, drainage water was also applied to the following cotton crop after thinning. Nonsaline water was used for irrigation at all other times and throughout for the control. When saline water was applied once every 3 yr, yields of both crops were unaffected. Tomato yields were generally lowest when saline water was applied 2 out of 3 yr, but saline water improved tomato fruit quality by increasing Brix in most years. Changes in soil chemical and physical quality may limit long-term reuse. Both B and salts accumulated in the soil over time, particularly at depth (60-140 cm), whereas Se was more readily leached and showed greater fluctuations in the rootzone with irrigation treatment. Calculations Using reclamation formulae estimated that for low B drainage water, the amount of drainage water used exceeded that of nonsaline water needed to return soil ECe to control levels, resulting in significant water savings. For high B drainage water, more than twice the amount of nonsaline water was needed to fully reclaim the profile than was saved by reuse. However, moderately B-tolerant crops could be successfully. nonsaline water supplies, or as a means to reduce effluent volumes.

NAL Call No.: QH540.J6

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54. Furrow infiltration and design with cannery wastewater. Xanthoulis, D.; Wallender, W. W.

Includes references.
Descriptors: sorghum-; surface-irrigation; waste-water;
design-; furrows-; infiltration-; cannery-wastes; tomatoes-;
waste-disposal; california-

Abstract: Surface irrigation is used to apply food processing wastewater. A newly developed flow-through infiltrometer was developed to measure the influence of wastewater quality on infiltration and irrigation performance. Steady infiltration rate decreased with increased loading of BOD and TS of tomato processing wastewater. Using a hydraulic model to simulate irrigation performance, it was shown that ignoring the decline in infiltration with increased loading and using the unadjusted infiltration function reduced predicted application efficiency 23%. Surface irrigation system design should therefore include the effect of wastewater quality.

NAL Call No.: 290.9-AM32T

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55. Golf course irrigation with reclaimed wastewater.
56. Guidelines for evaluating water quality related to crop growth.

Marsh, A. W.

Descriptors: crops--; growth--; irrigation-water;
water-quality; salinity--; permeability--; phytotoxicity-
NAL Call No.: 55.9-SP8
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Shuval, H. I.

Descriptors: waste-water; water-reuse; irrigation-water;
health-protection; regulations--; historical-records; usa-
NAL Call No.: TD420.A1P7
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58. Heavy metals in soils and alfalfa (Medicago sativa L.) irrigated with three sources of wastewater.

Carrillo G., R.; Cajuste, L. J.

Includes references.
Descriptors: waste-water; irrigation--; heavy-metals;
trace-elements; soil-properties; medicago-sativa; uptake--;
leaves--; roots--; pollution--; mexico-
NAL Call No.: TD172.J6
*******************************************************************************

59. Heavy metals in some water- and wastewater-irrigated soils of Oman.

Mujeriego, R.; Sala, L.

Descriptors: waste-water-treatment; water-reuse;
irrigation-water; requirements--; golf-courses; public-health;
health-protection; microbial- contamination; water-resources;
water-quality; physicochemical-properties; operation--;
maintenance--; costs--; spain-
NAL Call No.: TD420.A1P7
*******************************************************************************

56. Guidelines for evaluating water quality related to crop growth.

Marsh, A. W.

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NAL Call No.: 55.9-SP8
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Shuval, H. I.

Descriptors: waste-water; water-reuse; irrigation-water;
health-protection; regulations--; historical-records; usa-
NAL Call No.: TD420.A1P7
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58. Heavy metals in soils and alfalfa (Medicago sativa L.) irrigated with three sources of wastewater.

Carrillo G., R.; Cajuste, L. J.

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trace-elements; soil-properties; medicago-sativa; uptake--;
leaves--; roots--; pollution--; mexico-
NAL Call No.: TD172.J6
*******************************************************************************

59. Heavy metals in some water- and wastewater-irrigated soils of Oman.
Abdelrahman, H. A.; Al Ajmi, H.

Includes references.
Descriptors: water-conservation; water-quality; 
water-waste-treatment; discharge-; waste-water; water-reuse; 
irrigation-water; irrigated-soils; soil-pollution; 
heavy-metals; oman-
NAL Call No.: S590.C63
*******************************************************************************

60. Human waste use: health protection practices and scheme monitoring.
Strauss, M.

Water-Sci-Technol-J-Int- Assoc-Water-Pollut-Res-Control v.24, 
In the series analytic: Wastewater Reclamation and 
Reuse/edited by R. Mujeriego and T. Asano. Proceedings of the 
International Symposium of Wastewater Reclamation and Reuse, 
Descriptors: man-; wastes-; waste-utilization; 
aricultural-production; aquaculture-; public-health; 
health-protection; waste-water; water-reuse; guidelines-; 
water-waste-treatment; irrigation-water
NAL Call No.: TD420.A1P7
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61. Induction of phytoestrogen production in Medicago sativa 
leaves by irrigation with sewage water.
Badamy, H.; Shemesh, M.

Includes references.
Descriptors: medicago-sativa; coronilla-varia; 
plant-estrogens; plant-composition; leaves-; coumestrol-; 
irrigation-; irrigation-water; sewage-effluent
NAL Call No.: 450-R11
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62. Infiltration percolation for reclaiming stabilization 
pond effluents.
Brissaud, F.; Restrepo Bardon, M.; Soulie, M.; Joseph, C.

Water-Sci-Technol-J-Int- Assoc-Water-Pollut-Res-Control v.24, 
In the series analytic: Wastewater Reclamation and 
Reuse/edited by R. Mujeriego and T. Asano. Proceedings of the 
International Symposium of Wastewater Reclamation and Reuse, 
Descriptors: waste-water-treatment; stabilizing--; ponds--; 
infiltration--; percolation--; construction--; water-reuse; 
irrigation-water; lawns-and-turf; landscape-gardening; 
france-
NAL Call No.: TD420.A1P7
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63. Influence of irrigation water salinity on optimal nitrogen, phosphorus, and potassium liquid fertilizer rates for Spathiphyllum 'Petite'.
Campos, R.; Reed, D. W.
Includes references.
Descriptors: spathiphyllum--; ornamental-foliage-plants; npk-fertilizers; application-rates; liquid-fertilizers; irrigation-water; saline-water; salt-tolerance; growth-rate; plant-composition; nutrient-uptake; sodium--; calcium--; chloride--; phytotoxicity-
NAL Call No.: SB1.J66
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64. International perspective on water resources management and wastewater reuse--appropriate technologies.
Bartone, C. R.
Descriptors: waste-water; water-reuse; irrigation-water; aquaculture-
NAL Call No.: TD420.A1P7
******************************************************************************

65. Investigation of typhoid fever and cholera transmission by raw wastewater irrigation Santiago, Chile.
Shuval, H. I.
Descriptors: irrigation-water; waste-water; salmonella-typhi; vibrio-cholerae; disease-transmission; chile-
NAL Call No.: TD420.A1P7
******************************************************************************

66. Irrigating with municipal sewage effluent in a rural environment.
Hayes, G. J.; De Walle, F.
Includes references.
Descriptors: sewage-effluent; irrigation-water; groundwater-pollution; surface-water; water-quality; rural-areas; environmental-impact; california--; nevada--;
67. Irrigation management and investment under saline, limited drainage conditions. 3. Policy analysis and extensions.
Knapp, K. C.

Includes references.
Descriptors: irrigation-; management-; water-policy; drainage-water; irrigation-water; salinity-; water-quality; water-reuse; gossypium-; lycopersicon- esculentum; rotations-; water-costs; water-demand
Abstract: Water demand is characterized for the cotton-cotton-tomatoes rotation considered in the previous paper (Knapp, this issue (b)). Demand is found to be price inelastic. However, currently low water prices imply that fairly moderate increases in water prices can result in large water savings. A marginal cost curve for source control of drain water emissions is constructed. Moderate increases in drainage emissions fees can result in large reductions in drain water emissions with relatively small impacts on income. Management response and income effects from increased water salinity are estimated. The model is also extended to consider drain water reuse. Typical optimal management with reuse is low-volume, low-quality water on first-year cotton, improved quality and quantity on second-year cotton, and the highest quality water on salt-sensitive tomatoes. An approach to maximization of multifield farm-level returns is proposed using decentralized pricing and the field-level optimization model.

68. Irrigation of bananas with secondary treated sewage effluent. II. Effect on plant nutrients, additional elements and pesticide residues in plants, soil and leachate using drainage lysimeters.
Johns, G. G.; McConchie, D. M.

Includes references.
Descriptors: musa-acuminata; sewage-effluent; irrigated-conditions; plant-nutrition; size-; nutrients-; leaves-; stems-; pulps-; peel-; pesticide-residues; leachates-; lysimeters-; plant-size
NAL Call No.: 23-Au783

69. Irrigation of citrus with reclaimed water.
Perry, T. C.

Typescript.
Descriptors: Citrus-Irrigation; Water-reuse-Research
70. Irrigation of eucalypt plantations on deep sands using sewage effluent: a proposed alternative to ocean disposal near Perth, Western Australia.
Manning, C. R.; Kirkman, H.
Includes references.
Descriptors: eucalyptus-; forest-plantations; irrigation-; sewage-effluent; western-australia
NAL Call No.: 99.8-AU74

71. Irrigation of temperate fruit crops with saline water.
Noble, C. L.; West, D. W.
Descriptors: temperate-fruits; temperate-tree-fruits; irrigation-; saline-water; irrigation-water; salinity-; sodium-chloride; phytotoxicity-
NAL Call No.: 80-Ac82

72. Irrigation of turfgrass with secondary sewage effluent: soil quality.
Mancino, C. F.; Pepper, I. L.
Includes references.
Descriptors: cynodon-dactylon; lawns-and-turf; irrigation-water; sewage-effluent; waste-utilization; waste-water; soil-chemistry; electrical-conductivity; potassium-; soil-ph; sodium-; phosphorus-; soil-fertility; zinc-; iron-; manganese-; copper-; soil-organic-matter; soil-bacteria; arizona-
Abstract: Effluent and other secondary waters have become important sources of irrigation water in the U.S. Southwest. Information is inadequate relative to potential long-term effluent irrigation effects on turfgrass and soil chemical quality. The objective of this field research was to determine the influence of secondarily treated municipal wastewater irrigation on the chemical quality of bermudagrass (Cynodon dactylon L.) turf soil (Sonoita gravelly sandy loam: coarse-loamy, mixed, thermic Typic Haplargid) when compared to similarly irrigated potable water plots.
Research plots were irrigated using a 20% leaching fraction. After 3.2 yr of use, effluent water increased soil electrical conductivity by 0.2 ds m⁻¹, Na by 155 mg kg⁻¹, P by 26 mg kg⁻¹, and K by 50 mg kg⁻¹ in comparison to potable irrigated plots. Soil pH was not significantly affected by effluent irrigation. The concentrations of Fe, Mn, Cu, and Zn were found to be within the range considered normal for agricultural soil. Effluent irrigation increased soil total...
organic carbon and nitrogen during the first 1.3 yr of irrigation only. Total aerobic bacteria populations were similar in all irrigated plots indicating these microbes were not promoted or inhibited by the use of this wastewater. In summary, the irrigation of this turf soil for 3.3 yr with the secondarily treated wastewater used in this study had no serious detrimental effects on soil quality.

NAL Call No.: 4-AM34P

73. Irrigation with sewage effluents: the Israeli experience. Avnimelech, Y.

Special issue: Israel's growing environmental consciousness. Descriptors: sewage-effluent; fertigation-; waste-water-treatment; water-reuse; water-purification; saline-water; israel-
NAL Call No.: TD420.A1E5


Includes references. Descriptors: gossypium-hirsutum; triticum-aestivum; beta-vulgaris-var; -saccharifera; rotations-; salt-tolerance; saline-water; drainage-water; water- reuse; irrigation-water; water-quality; trickle-irrigation; furrow-irrigation; soil-salinity; salts-in-soil; electrical-conductivity; profiles-; chlorine-; sulfates-; boron-; selenium-; soil-toxicity; ion-uptake; phytotoxicity-; leaching-; soil-depth; groundwater-level; water-management; water-requirements; evapotranspiration-; rain-; water-uptake; california-; drainage-water-management; shallow-groundwater Abstract: Use of saline drainage water in irrigated agriculture, as a means of its disposal, was evaluated on a 60 ha site on the west side of the San Joaquin Valley. In the drip irrigation treatments, 50 to 59% of the irrigation water applied during the six-year rotation was saline with an EC(w) ranging from 7 to 8 dS/m, and containing 5 to 7 mg/L boron and 220 to 310 micrograms/L total selenium. Low salinity water with an EC(w) of 0.4 to 0.5 dS/m and B approximately equal to 0.4 mg/L was used to irrigate the furrow plots from 1982 to 1985 after which a blend of good quality water and saline drainage water was used. A six-year rotation of cotton, cotton, cotton, wheat, sugar beet and cotton was used. While the cotton and sugar beet yields were not affected during the initial six years, the levels of boron (B) in the soil became quite high and were accumulated in plant tissue to near toxic levels. During the six year period, for treatments surface irrigated with saline drainage water or a blend of saline and low salinity water, the B concentration in the soil increased throughout the 1.5 m soil profile while the electrical conductivity...
(EC(e)) increased primarily in the upper 1 m of the profile. Increases in soil EC(e) during the entire rotation occurred on plots where minimal leaching was practiced. Potential problems with germination and seedling establishment associated with increased surface soil salinity were avoided by leaching with rainfall and low-salinity pre-plant irrigations of 150 mm or more. Accumulation of boron irrigation. This is particularly true in areas where toxic materials (salt, boron, other toxic minor elements) cannot be removed from the irrigated area. Continual storage within the root zone of the cropped soil is not sustainable.

NAL Call No.: S612.I756

75. Long term use of sodic waters in North India and the reliability of empirical equations for predicting their sodium hazard.

Manchanda, H. R.
In the series analytic: Towards the rational use of high salinity tolerant plants. 2. Agriculture and forestry under marginal soil water conditions / edited by H. Lieth and A.A. Al Masoom. Proceedings of the 1st ASWAS Conference held December 8-15, 1990, Al Ain, United Arab Emirates.
Descriptors: irrigation-; sodic-water; sodium-; phytotoxicity-; equations-; water-quality; saline-water; crops-; rotations-; sodium-adsorption-ratio
NAL Call No.: QK1.T37

76. Meeting regional septage disposal needs.

Giggey, M. D.; Marcy, G. J.
Biocycle v.35, p.74-76, 78, 80, 82. (1994).
Descriptors: septic-tank-effluent; waste-water-treatment; waste-disposal; composting-; water-reuse; irrigation-water
NAL Call No.: 57.8-C734


Descriptors: Sewage-irrigation-Florida; Citrus-fruits-Irrigation-Florida; Sprinkler-irrigation-Florida
NAL Call No.: TD760.M49--1994

78. Microsprinkler irrigation of young 'Redblush' grapefruit trees using reclaimed water.
Maurer, M. A.; Davies, F. S.

Includes references.
Descriptors: citrus-paradisi; fertigation--; sprinkler-irrigation; water-reuse; waste-water; irrigation-water; water-quality; application-rates; age-of-trees; growth-rate; plant-composition; sodium--; chloride--; boron--; phosphorus--; potassium--; nitrogen--; nutrient-deficiencies; florida--

Abstract: Two field studies conducted from 1990 to 1991 evaluated the effects of reclaimed water on growth and development of 1- and 2-year-old 'Redblush' grapefruit (Citrus paradisi Macf.) trees on Swingle citrumelo [Citrus paradisi (L.) Osb. X Poncirus trifoliata (L.) Raf.] rootstock. Treatments were arranged as a 3 (water sources) X 3 (irrigation levels) factorial at two locations on an Arredondo (well drained) and Kanapaha (poorly drained) fine sand near Gainesville, Fla. Irrigation treatments included 1) reclaimed water, 2) reclaimed water plus fertigation, and 3) well water plus fertigation. The reclaimed water was formulated to simulate that of a sewage treatment plant at Vero Beach, Fla. Irrigation was applied at 20% soil moisture depletion, or at 19 or 25 mm.week-1 regardless of rainfall. In both experiments, visual ratings of tree vigor, and measured tree height and trunk diameter, were significantly lower for trees watered with reclaimed water without fertilizer than for the others in both years. Moreover, there was no fourth leaf flush in 1991 with reclaimed water. There was a significant increase in leaf Na, Cl, and B concentrations for the reclaimed water and reclaimed water plus fertigation treatments in 1990; however, in 1991 only leaf B concentrations showed a similar trend. In 1991, there were no significant differences in leaf Cl concentrations. Visual symptoms of N deficiency were observed by the end of the first season in trees grown with reclaimed water. Irrigation levels generally did not affect tree growth.

NAL Call No.: SB1.H6

79. Monitoring large scale wastewater reclamation systems--policy and experience.
Azov, Y.; Juanico, M.; Shelef, G.

Descriptors: waste-water-treatment; effluents--; quality-controls; monitoring--; programs--; water-reuse; irrigation-water; israel--
NAL Call No.: TD420.A1P7

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Descriptors: waste-water-treatment; reclamation--; systems--; effluents--; water-reuse; irrigation-water; water-quality; monitoring--; underground-storage; microbial-contamination; israel-
NAL Call No.: TD420.A1P7
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81. Municipal effluent irrigation of fast-growing hybrid popular plantations near Vernon, British Columbia. Carlson, M.

Descriptors: populus-deltoides; populus-trichocarpa; populus-nigra; hybrids--; clones--; forest-plantations; irrigation--; sewage-effluent; waste-water; growth--; plant-height; volume--; british-columbia
NAL Call No.: 99.8-F7623
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82. Municipal water reuse at Tallahassee, Florida.
Allhands, M. N.; Allick, S. A.; Overman, A. R.; Leseman, W. G.; Vidak, W.

Includes references.
Descriptors: fodder-crops; irrigation--; water-reuse; waste-water; soil-depth; organic-matter; cation-exchange-capacity; nutrient-uptake; soil-ph; florida-
Abstract: Characteristics of municipal reclaimed water (treated wastewater) and of the soil affect design and operation of a land application system for crop production. In this study field measurements showed an exponential decrease with soil depth in organic matter, cation exchange capacity, exchangeable acidity, and available phosphorus. A linear increase in dry matter yield plant N uptake, and plant K uptake with harvest interval was observed for warm-season bermudagrass. For a harvest interval of six weeks and a seasonal loading rate of 194 kg N/ha, 33 kg P/ha, and 97 kg K/ha, bermudagrass production was estimated as 7.43 Mg/ha dry matter yield and plant uptake of 108 kg N/ha, 22 kg P/ha, and 53 kg K/ha. Corresponding values for winter rye were 4.25 Mg/ha, 145 kg N/ha, 23 kg P/ha, and 66 kg K/ha. The cation exchange capacity of the soil was dominated by calcium, due
to calcium in the city water supply from a limestone aquifer, with only about 2% occupied by potassium. Soil pH stabilized at 7.0 in response to reclaimed water pH of 7.5. At the soil surface soil phosphorus was 90 mg P/kg soil, cation exchange capacity 3.0 meq/100 g soil, and organic matter 1%. Flexibility in management proved essential for success of the farming operation. A Farm Information Committee meets quarterly to discuss matters of mutual interest for the farm, public utility, and research.

NAL Call No.: 290.9-Am32T
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83. Nitrate management with subsurface drip irrigation.
Phene, C. J.; Ruskin, R.

Clean water, clean environment, 21st century team agriculture, working to protect water resources conference proceedings, March 5-8, 1995, Kansas City, Missouri / St. Joseph, Mich. : ASAE, c1995.. v. 2 p. 159-162. Includes references.
Descriptors: trickle-irrigation; subsurface-irrigation; waste-water; water-reuse; irrigation-water; nitrate-; nitrate-nitrogen; leaching--; ammonium--; nutrient-uptake; zea-mays; nitrification--; nitrogen-fertilizers; fertigation-
NAL Call No.: TD365.C54-1995
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84. Nitrogen fixation in a white clover-grass pasture irrigated with saline groundwater.
Smith, C. J.; Chalk, P. M.; Noble, C. L.; Prendergast, J. B.; Robertson, F.

Descriptors: trifolium-repens; paspalum-dilatatum; lolium-perenne; nitrogen-fixation; grassland-soils; irrigated-conditions; saline-water; irrigation- water; groundwater--; water-reuse; victoria-
Abstract: Nitrogen (N2) fixation in an irrigated white clover-grass sward was estimated using the (15)N isotope dilution technique following the addition of K(15)NO3 at 0.5 g N m(-2) and 80 atom % (15)N in a field study during the 1990-91 season. Two water salinity treatments (channel water; ECw = 0.07 and groundwater; 2.4 dSm(-1) and four irrigation frequencies were included in a factorial design with four replicates. The channel water treatments were irrigated when pan evaporation minus rainfall equalled 50 mm, whereas the groundwater treatments were irrigated at deficits of 40, 50, 65 or 80 mm. Cumulative dry matter of the clover was significantly less in treatments irrigated with saline groundwater compared to channel water at day 164, and soil salinities (ECe) increased on average from 2.3 to 5.07 dSm(-1). In contrast, salinity of the irrigation water had no effect on the cumulative yield of grass. Cumulative dry matter of the grass and clover were not affected by groundwater irrigation frequency. Total N accumulation by the grass did not differ significantly between treatments.
However, total N accumulation in white clover was significantly less (P < 0.05) in all treatments irrigated with groundwater compared to channel water. Neither the N concentrations of the grass nor the clover differed significantly between the salinity treatments. Salinity and irrigation frequency had no effect on the proportion of clover N (P atm) derived from N2 fixation. The values of P atm were high throughout, and increased progressively from 0.78 at day 39 to 0.91 at day 164 (P < 0.01). Thus to moderate soil salinity did not affect the symbiotic dependence of clover, but the yield of.

85. Nitrogen-fixing heterotrophic bacteria and presumptive coliforms in sewage treatment plants and irrigation reservoirs in Libya.
Betaieb, M.; Jones, K.
Includes references.
Descriptors: coliform-bacteria; enterobacteriaceae-; nitrogen-fixing-bacteria; microbial-contamination; irrigation-water; water-reservoirs; sewage- effluent; sewage-effluent-disposal; waste-water-treatment; libya-
NAL Call No.: QR1.L47
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86. Occurrence of Phytophthora species in recirculated nursery irrigation effluents.
MacDonald, J. D.; Ali Shtayeh, M. S.; Kabashima, J.; Stites, J.
Includes references.
Descriptors: phytophthora-; species-; detection-; irrigation-; runoff-water; waste-water; water-reuse;
water-quality; seasonal-fluctuations; runoff- irrigation
NAL Call No.: 1.9-P69P; DLC PAR; PPUSDA x
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87. Pepper (Capsicum annuum) cultivar response to metolachlor in three New Mexico soils.
Schroeder, J.
Includes references.
Descriptors: capsicum-annuum; cultivars-;
varietal-susceptibility; crop-damage; metolachlor-;
phytotoxicity-; crop-yield; yield-losses; irrigation-water;
water-quality; herbicide-resistance; new-mexico
NAL Call No.: SB610.W39
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88. Performance of an integrated ponding system operated in arid zones.
Puskas, K.; Esen, I. I.; Banat, I.; Al Daher, R.

Descriptors: waste-water-treatment; ponds-; integrated-systems; arid-regions; water-reuse; irrigation-water; algae-; biomass-production; kuwait-
NAL Call No.: TD420.A1P7
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89. Photosynthetic and growth responses of two broad-leaf tree species to irrigation with municipal landfill leachate. Shrive, S. C.; McBride, R. A.; Gordon, A. M.

Includes references.
Descriptors: acer-rubrum; populus-; landfill-leachates; waste-disposal; application-to-land; irrigation-; application-rates; photosynthesis-; leaf- conductance; stomata-; phytotoxicity-; leaves-; toxic-substances; ontario-
Abstract: A study was undertaken to investigate leaf photosynthesis and stem growth responses of saplings of two broad-leaf tree species to irrigation with municipal solid waste (MSW) leachate in a northern temperate climate at Ontario, Canada. The objective was to quantify plant stresses or changes in plant productivity that could be attributed to this low technology option for the treatment and disposal of groundwater contaminated by municipal refuse. Red maple (Acer rubrum L.) and hybrid poplar [Populus spp. nigra X maximowiczii (NM6)] were subjected to two consecutive seasons of leachate irrigation in a three factor, RCBD split-plot field experiment. The three factors were irrigant type (MSW leachate, water), mode of application (spray, surface trickle, subsurface irrigation), and rate of application (3.5, 7.0, and 14.0 mm d-1). The main treatment plots in each of three blocks were split into subplots planted to different tree species. In the second irrigation season, the mean seasonal photosynthesis rates increased for irrigated saplings of both species relative to rain-fed control saplings, irrespective of irrigant type. Mean seasonal photosynthesis rates for red maple increased with irrigant application rate, but were unaffected by irrigant type. Incremental stem diameter and height growth for this species were largely unaffected by the experimental treatments. Mean seasonal photosynthesis rates for hybrid poplar were unaffected by either irrigant type or application rate, but stem growth did increase significantly with leachate irrigation. The mode of irrigant application was not a significant factor in explaining plant response for either species. Direct exposure of. induce phytotoxic symptoms in the saplings. Irrigation of a MSW leachate of relatively high ionic strength can he carried out successfully on clay soils under Ontario climatic conditions without causing significant adverse effects on saplings of
these tree species. Treatment and disposal of MSW leachates in tree plantations may offer a low technology, low cost option to municipalities.

Gambrill, M. P.; Mara, D. D.; Silva, S. A.

Descriptors: households--; waste-water; stabilizing--; ponds--; waste-water-treatment; technology--; effluents--; microbiology--; health--; safety--; water-reuse; irrigation-water; brazil--

91. Planning and implementation of water reuse projects.
Asano, T.

Descriptors: waste-water-treatment; costs--; water-reuse; irrigation-water; planning--; constraints--; water--; resources--; water-supply; groundwater--recharge; urban-areas; municipal-wastewater

92. Planning for reuse. Developing a strategy for the Northern Territory, Australia.
Burgess, M. D.

Descriptors: waste-water-treatment; water-reuse; irrigation-water; economic-analysis; environmental-impact; planning--; waste-disposal; drinking-water; water-resources; australian-northern-territory

93. Pollution and public health problems related to irrigation.
Hornsby, A. G.

In the series analytic: Irrigation of agricultural crops/editied by B.A. Stewart and D.R. Nielsen.
Descriptors: irrigation-; water-pollution; pollutants-; agricultural-land; public-health; assessment-
NAL Call No.: 4-Am392
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94. Possible reuse of treated municipal wastewater for Citrus spp. plant irrigation.
Lapena, L.; Cerezo, M.; García Augustin, P.

Includes references.
Descriptors: citrus-; waste-water; irrigation-water; irrigation-; waste-utilization; mineral-content; phytotoxicity-; growth-; spain-
NAL Call No.: RA1270.P35A1
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95. Problems of irrigation drainage water utilization for the prevention of surface water pollution.
Sanin, M. V.

Descriptors: irrigation-water; drainage-water; loads-; body-water; water-reuse; surface-water; water-pollution; salinization-; prevention-; ussr-
NAL Call No.: TD420.A1P7
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96. Public health concerns in wastewater reuse.
Cooper, R. C.

Descriptors: waste-water; water-use; water-resources; irrigation-water; groundwater-; recharge-; drinking-water; public-health; health-protection; water- pollution
NAL Call No.: TD420.A1P7
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Helmer, R.; Hespanhol, I.; Saliba, L. J.
98. Quality criteria for reclaimed water.
Crook, J.

Descriptors: waste-water-treatment; water-reuse; irrigation-water; water-quality; quality-standards; microbiology--; chemicals--; public-health; health-protection; guidelines--; who--; usa-
NAL Call No.: TD420.A1P7
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99. The quality of Arizona irrigation waters.
Smith, H. V. H. V. 1.; Draper, G. E.; Fuller, W. H.

Bibliography: p.21-22.
Descriptors: Water-supply-Arizona; Water-Composition; Irrigation-water; Water,-Underground-Arizona
NAL Call No.: 100-Ar4M-no.223
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100. Re-use systems in the Kerang region.
Victoria. Dept. of Agriculture.

Cover title.
Descriptors: Water-reuse-Australia-Victoria-Kerang; Irrigation-Australia-Victoria-Kerang-Management
NAL Call No.: TD429.R48--1994
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101. Recent developments in membrane water reuse projects.
Freeman, S. D. N.; Morin, O. J.

Descriptors: water-reuse; waste-water; factory-effluents;
102. Reclaimed wastewater for irrigation of citrus in Florida.
Davies, F. S.; Maurer, M. A.

Descriptors: citrus-paradisi; irrigation-water; water-quality; waste-water; waste-utilization; crop-production; crop-yield; crop-quality; growth-rate; fruit; fertigation; florida
NAL Call No.: SB317.5.H68
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103. Reclaimed water to the rescue.
Engle, M.

Descriptors: water-reuse; irrigation-; irrigation-systems; gray-water
NAL Call No.: SB379.A9A9
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104. Reclamation Wastewater and Groundwater Study Act and Reclamation Projects Authorization and Adjustment Act of 1990: hearing before the Subcommittee on Water and Power of the Committee on Energy and Natural Resources, United States Senate, One Hundred First Congress, second session, on S. 2657... H.R. 2567... September 27, 1990.

Distributed to some depository libraries in microfiche.
Descriptors: Water-resources-development-Law-and-legislation-United-States; Water-reuse-United-States; Irrigation-laws-United-States
NAL Call No.: KF26.E559-1990d
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105. Recycling drainage water in San Joaquin Valley, California.
Oron, G.

Includes references.
106. Recycling wastewater in Florida. 
Woods, C. T.

In the series analytic: Agriculture and the Environment / edited by D. Takiff Smith. 
Descriptors: water-reuse; recycling--; waste-water; waste-water-treatment; irrigation-water; resource-allocation; environmental-protection; florida- 
NAL Call No.: 1-Ag84y

107. Reduction of lead accumulation by ethylenediamine tetraacetic acid and nitrilo triacetic acid in okra (Abelmoschus esculentus L.) grown in sewage-irrigated soil. 
Denduluri, S. 

Includes references. 
Descriptors: abelmoschus-esculentus; sewage--; waste-water; irrigation-water; lead--; uptake--; phytotoxicity--; edta--; nitrilotriacetic-acid 
NAL Call No.: RA1270.P35A1

108. Removal of trace metals from wastewater during long-term storage in seasonal reservoirs. 
Juanico, M.; Ravid, R.; Azov, Y.; Teltsch, B. 

Includes references. 
Descriptors: copper--; zinc--; chromium--; lead--; aluminum--; removal--; water-quality; water-reservoirs; waste-water; sewage-effluent; water-reuse; irrigation-water; geological-sedimentation; israel--; stabilization-reservoirs 
NAL Call No.: TD172.W36

109. A report from Malta: water supply and liquid and solid wastes collection and disposal in the Maltese Islands. 
Jaccarini, J. M.; Degaetano, J. C. 

Includes references. 
Descriptors: water-supply; water-pollution; water-purification; water-reuse; irrigation-water; malta- 
NAL Call No.: TD420.W374
110. Residual contamination of crops irrigated with effluent of different qualities: a field study.
Armon, R.; Dosoretz, C. G.; Azov, Y.; Shelef, G.

Descriptors: horticultural-crops; sprinkler-irrigation; irrigation-water; water-reuse; sewage-effluent; waste-water-treatment; microbial-contamination; salmonella--; fecal-coliforms; bacteriophages--; indicator-species; coliform-bacteria; water-quality; vegetables--; coliphages-
NAL Call No.: TD420.A1P7

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111. Residual faecal contamination on effluent-irrigated lettuces.
Vaz da Costa Vargas, S. M.; Mara, D. D.; Vargas Lopez, C. E.

Descriptors: lactuca-sativa; irrigated-stands; septic-tank-effluent; sprinkler-irrigation; crops--; contamination--; fecal-flora; decontamination--; irrigation-water; waste-water-treatment; water-reuse; public-health; health-protection; quality-standards; portugal-
NAL Call No.: TD420.A1P7

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112. Response of young olive trees to sodium and boron excess in irrigation water.
Benlloch, M.; Arboleda, F.; Barranco, D.; Fernandez Escobar, R.

Includes references.
Descriptors: olea-europaea; cultivars--; responses--; saline-water; irrigation-water; boron--; tolerance--; rooting--; cuttings--; shoots--; growth--; elements--; distribution--; leaves--; ratios--; maturity-stage; salt-tolerance; phytotoxicity--; culture-media; greenhouse-culture; nutrient-excesses; sodium--; potassium--; spain-
Abstract: The influence of sodium and boron excess in the irrigation water on shoot growth and on the distribution of these elements within various leaf types was studied on rooted olive cuttings (Olea europaea L.). 'Lechin de Granada' was more tolerant than 'Manzanillo' to sodium excess, as indicated by greater shoot growth and lower accumulation of sodium, especially in the young leaves.'Picual' was more
tolerant to boron than 'Manzanillo', with less accumulation in adult leaves. The results suggest the avoidance of toxicity by an ionic exclusion mechanism that is more effective in some cultivars than others. Also, the results reveal cultivar differences in the tolerance of olive to sodium and boron excess in the culture medium.

NAL Call No.: SB1.H6
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113. Reuse of waste water for irrigation in the West Bank: some aspects.
Sbeih, M. Y.

In the series analytic: Water and peace in the Middle East / edited by J. Isaac and H. Shuval.
Descriptors: water-resources; water-management; sewage-effluent; sewage-; irrigation-water; israel-; occupied-palestinian-territories; water-reuse; water-reclamation
NAL Call No.: QH540.S8
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114. Reuse of wastewater from meat processing plants for agricultural and forestry irrigation.
Russell, J. M.; Cooper, R. N.; Lindsey, S. B.

Descriptors: meat-and-livestock-industry; industrial-wastes; chemical-composition; water-reuse; irrigation-water; irrigated-pastures; forestry-; groundwater-pollution; nitrates-; new-zealand
NAL Call No.: TD420.A1P7
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115. Reuse simulation in irrigated river basin.
Smedema, L. K.; Wolters, W.; Hoogenboom, P. J.

Includes references.
Descriptors: basin-irrigation; irrigation-water; drainage-water; water-reuse; simulation-models; pakistan-
NAL Call No.: 290.9-AM3Ps-IR
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116. Revision of standards and specifications for water management at farm level.
Pakistan Agricultural Research Council.

iii, 38 p. : ill. .
"Final technical report of the PL-480 coordinated research project on, "Revision of Standards and Specifications for Water Management at Farm Level" under USDA grant numbers FG-Pa404 to 408 (PK-ARS 246 to 250) implemented from July 1986 to June 1990."

Descriptors: Irrigation-farming-Pakistan
NAL Call No.: S616.P18R49--1993

117. Role of groundwater recharge in treatment and storage of wastewater for reuse.

Bouwer, H.

Descriptors: waste-water-treatment; water-storage; water-quality; requirements--; water-reuse; irrigation-water; irrigated-stands; vegetables--; microbial- contamination; pathogens--; groundwater-recharge; application-to-land; aquifers--; public-health; health-protection; drinking-water
NAL Call No.: TD420.A1P7

118. The role of wastewater reclamation and reuse in the USA.

Asano, T.; Tchobanoglous, G.

Descriptors: waste-water-treatment; water-reuse; irrigation-water; health-protection; water-resources; water-management
NAL Call No.: TD420.A1P7

119. Saline drain water reuse in agroforestry systems.

Tanji, K. K.; Karajeh, F. F.

Descriptors: drainage-water; saline-water; water-reuse; eucalyptus--; subsurface-drainage; california--; san-joaquin-valley
NAL Call No.: 290.9-AM3Ps-IR

120. Saline irrigation of cv. Manzanillo and Uovo di Piccione trees.

Klein, I.; Ben Tai, Y.; Lavee, S.; Malach, Y. de.; David, I.
121. Satellite wastewater reclamation plants: how to get what you bargain for.
McHaney, S. X.

Descriptors: urban-areas; waste-water; reclamation-; utilization-; irrigation-water; lawns-and-turf; landscape-; public-parks; golf-courses; california-
NAL Call No.: TD478.D4

122. Sensitivity of tobacco (Nicotiana tabacum) and vegetable crop seedlings to fluridone in irrigation water.

Includes references.
Descriptors: nicotiana-tabacum; lycopersicon-esculentum; capsicum-annuum; cucumis-sativus; seedlings-; irrigation-water; herbicide-residues; nontarget-effects; fluridone-; phytotoxicity-; irrigation-scheduling; crop-damage; abiotic-injuries; application-rates; aquatic-weeds; weed-control; chemical-control; ponds-
NAL Call No.: SB610.W39

123. Sequential batch-fed effluent storage reservoirs: a new concept of wastewater treatment prior to unrestricted crop irrigation.
Mara, D. D.; Pearson, H. W.

Descriptors: waste-water-treatment; effluents-; storage-; reservoirs-; water-reuse; irrigation-water; israel-
NAL Call No.: TD420.A1P7

124. Significance and current status of wastewater reuse in Sicily.
Croce, F.; Dardanoni, L.

Descriptors: waste-water; water-reuse; irrigation-water; water-resources; water-pollution; water-conservation; fresh-water; deficiency-; saline-water; desalinization-; public-health; health-protection; drinking-water; sicily-
NAL Call No.: TD420.A1P7
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125. Soil and sweet cherry responses to irrigation with wastewater.
Neilsen, G. H.; Stevenson, D. S.; Fitzpatrick, J. J.; Brownlee, C. H.

Includes references.
Descriptors: prunus-avium; sandy-soils; irrigation-water; waste-water; waste-utilization; nitrogen-fertilizers; soil-ph; electrical-conductivity; foliar-nutrition; nutrient-uptake
NAL Call No.: 56.8-C162
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126. Soil denitrification rates at wastewater irrigation sites receiving primary-treated and anaerobically treated meat-processing effluent.
Russel, J. M.; Cooper, R. N.; Lindsey, S. B.

Includes references.
Descriptors: meat-and-livestock-industry; effluents-; anaerobic-treatment; waste-water; irrigation-; soil-; denitrification-
NAL Call No.: TD930.A32
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Wang, T. j.; T'eng, C.

Descriptors: Irrigation-water-China; Water-quality-China
NAL Call No.: S618.45.N86--1992
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128. Studies on the influence of long-term municipal sewage-effluent irrigation on soil physical properties.
Mathan, K. K.
129. Subsurface microirrigation with effluent.
Oron, G.; DeMalach, J.; Hoffman, Z.; Cibotaru, R.
Includes references.
Descriptors: gossypium-hirsutum; zea-mays; triticum-aestivum; pisum-sativum; trickle-irrigation; subsurface-irrigation; emitters--; sewage-effluent; waste-water; nutrient-content; crop-yield; productivity--; semiarid-zones; arid-zones; israel-
NAL Call No.: 290.9-AM3PS-IR

130. Suitability of petrochemical industry wastewater for irrigation.
Aziz, O.; Manzar, M.; Inam, A.
Includes references.
Descriptors: waste-water; irrigation--; application-to-land; triticum-aestivum; cultivars--; growth--; crop-yield; soil-properties; crop-quality; india-
NAL Call No.: TD172.J6

131. Tips on irrigating woody plants with gray water.
Descriptors: woody-plants; irrigation--; water-reuse
NAL Call No.: S544.3.N7A4

132. Tolerance of putting green turfgrasses to simazine in irrigation water.
Murphy, T. R.; Johnson, B. J.
Includes references.
Descriptors: lawns-and-turf; golf--; sports-grounds; irrigation-water; mixtures--; simazine--; phytotoxicity--; cynodon--; cynodon-dactylon; hybrids--; lolium- perenne; agrostis-stolonifera-var; -palustris; crop-damage; crop-quality; cynodon-transvaalensis
NAL Call No.: SB610.W39

133. Treated municipal wastewater for citrus irrigation.
Zekri, M.; Koo, R. C. J.
Abstract: Treated, reclaimed municipal wastewater was evaluated on citrus trees in central Florida for over six years. The effects of irrigation with reclaimed wastewater on soil water content, soil chemical analysis, leaf mineral status, and fruit quality were compared with those of irrigation with well water. Irrigation with reclaimed water increased mineral residues in the soil profile, altered leaf mineral concentration and fruit quality, and promoted better tree performance and more weed growth relative to irrigation with well water. Higher accumulation of nitrogen (N), potassium (K), calcium (Ca), and magnesium (Mg) in soils irrigated with reclaimed water were not significantly reflected in leaf mineral status. Although leaf sodium (Na), chloride (Cl), and boron (B) concentrations were noticeably higher in reclaimed water treatments than in those of well water, they are still far below the toxicity levels. This highly treated wastewater in central Florida has been found to be a very safe and good option for increasing water supplies, but not a significant source of plant nutrients to citrus trees.

NAL Call No.: QK867.J67; LNSU QK867.J67

134. Treatment of wastewater from the textile industry.
Nicolaou, M.; Hadjivassilis, I.

Descriptors: textile-industry; waste-water-treatment; chemical-treatment; coagulation--; chemical-precipitation; activated-sludge; irrigation-water; water-reuse; cyprus-
NAL Call No.: TD420.A1P7

135. Treatment, reuse, and disposal of drain waters.
Lee, E. W.

Includes references.
Descriptors: drainage-water; agricultural-land; trace-elements; salts-in-soil; treatment--; water-reuse; disposal--; california--; agricultural-drainage-water
NAL Call No.: 290.9-AM3Ps-IR

136. The urban water cycle, including wastewater use in agriculture.
Pescod, M. B.
137. Use of aquaculture effluent as a supplemental source of nitrogen fertilizer to wheat crop. Al Jaloud, A. A.; Hussain, G.; Alsadon, A. A.; Siddiqui, A. Q.; Al Najada, A.

Arid-soil-res-rehabil v.7, p.233-241. (1993). Includes references. Descriptors: triticum-aestivum; aquaculture-; waste-water; water-reuse; irrigation-water; nitrogen-; nutrient-sources; nitrogen-fertilizers; urea-; application-rates; crop-yield; grain-; wheat-straw; yield-components; plant-height; biomass-production; dry-matter-accumulation; tillering-; tillers-; waste-utilization; saudi-arabia; greenmatter-production; tillers-per-plant
NAL Call No.: S592.17.A73A74

138. Use of reclaimed water for irrigation and fertigation of young 'Redblush' grapefruit trees. Maurer, M. A.; Davies, F. S.

NAL Call No.: SB319.2.F6F56

139. Use of tomato (Lycopersicon esulentum) seedlings to detect bensulfuron and quinclorac residues in water. Barreda, D. G. de.; Lorenzo, E.; Carbonell, E. A.; Cases, B.; Munoz, N.

Weed-technol v.7, p.376-381. (1993). Includes references. Descriptors: oryza-sativa; weed-control; chemical-control; herbicide-residues; quinclorac-; bensulfuron-; detection-; water-pollution; pollutants-; bioassays-; phytotoxicity-; lycopersicon-esulentum; water-quality; irrigation-water; irrigation-systems; spain-
NAL Call No.: SB610.W39


Includes references.
Descriptors: golf-courses; irrigation-systems; waste-water-treatment; sewage-effluent; fertilizers-; cost-benefit-analysis; salts-; sodium-; bicarbonates-; ions-; usa-
NAL Call No.: 60.18-UN33
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141. Wastewater disposal by sub-surface trickle irrigation.
Descriptors: waste-water-treatment; water-reuse; disposal-; irrigation-water; zea-mays; sweetcorn-; trickle-irrigation; crop-yield; israel-
NAL Call No.: TD420.A1P7
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Schneider, K.
Updates QB 90-64.
Descriptors: waste-water; irrigation-; bibliographies-
NAL Call No.: aZ5071.N3
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143. Wastewater irrigation onto managed forest lands.
Rubin, A. R.; Frederick, D.; Milosh, R.
Descriptors: irrigation-; forests-; waste-water
NAL Call No.: 290.9-Am32P
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144. Wastewater reclamation and water resources management.
Shelef, G.
Descriptors: waste-water-treatment; water-reuse; irrigation-water; water-resources; water-quality;
145. Wastewater reuse case studies in the Middle East.
Banks, P. A.

Paper presented at the "Fifteenth Biennial Conference of the
International Association on Water Pollution Research and
Descriptors: waste-water; water-reuse; irrigation-water;
water-quality; quality-standards; waste-water-treatment;
case-studies; middle-east
NAL Call No.: TD420.A1P7

146. Wastewater reuse for golf course irrigation. Waste
water reuse for golf course irrigation.
United States Golf Association.

maps.
Papers presented at a conference held in 1993.
Descriptors: Sewage-irrigation-Congresses;
Golf-courses-Congresses
NAL Call No.: TD760.W354--1994

147. Wastewater reuse for irrigation in the Near East Region.
Arar, A.

Paper presented at the "Fifteenth Biennial Conference of the
International Association on Water Pollution Research and
Descriptors: waste-water-treatment; water-reuse;
irrigation-water; public-health; health-protection;
middle-east
NAL Call No.: TD420.A1P7

148. Wastewater treatment and reuse aspects of Lake Valencia,
Venezuela.
Lansdell, M.; Carbonell, L. M.

In the series analytic: Wastewater Reclamation and
Reuse/editoried by R. Mujeriego and T. Asano. Proceedings of the
International Symposium of Wastewater Reclamation and Reuse,
Descriptors: waste-water-treatment; water-reuse; lakes-;
irrigation-water; drinking-water; water-resources;
water-quality; venezuela-
149. Water conservation approaches for commercial nurseries.
Engle, M.
Descriptors: nurseries-; water-conservation; irrigation-systems; trickle-irrigation; water-reuse; water-use-efficiency; public-relations; california-

150. Water quality criteria for irrigation with highly saline water.
Suarez, D. L.; Lebron, I.
In the series analytic: Towards the rational use of high salinity tolerant plants. 2. Agriculture and forestry under marginal soil water conditions / edited by H. Lieth and A.A. Al Masoom. Proceedings of the 1st ASWAS Conference held December 8-15, 1990, Al Ain, United Arab Emirates.
Descriptors: irrigation-water; saline-water; water-quality; soil-salinity; soil-physical-properties; crop-production

151. Water reclamation and reuse.
Smith, R. G.
Literature review.
Descriptors: water-pollution; water-purification; waste-water-treatment; water-reuse; irrigation-water; usa-; u; s; -environmental-protection-agency

152. Water reclamation and reuse.
Smith, R. G.; Walker, M. R.
Includes references.
Descriptors: water-; reclamation-; water-reuse; planning-; management-; irrigation-water; drainage-water; literature-reviews

153. Water reclamation and reuse.
Smith, R. G.
Includes references.
Descriptors: water-reuse; groundwater-recharge; water-resources; waste-water; irrigation-; irrigation-water;