

401. Effect of environmental conditions during germination on the development of field-crop yields

By Haller, E.

From [Eesti Pollumajanduse Akadeemia Teaduslike Toode Kogumik \(1970\), 69, 17-50](#). Language: Russian, Database: CAPLUS

Environmental conditions during germination and initial phases of root formation in agricultural plants have important effects on their crops. Calciophilic plants (*Melilotus albus*, *Medicago sativa*, and barley) are very sensitive to the pH of the soil during germination. Plants germinated in unfavorable pH conditions (such as acid soil) do not fully recover after being transferred into neutral soil, and crops from such cultures are reduced by up to 90%. On the other hand, plants germinated in favorable conditions can produce good crops even when grown in acid soil for most of their vegetation period. Temp., H₂O content, aeration, and mineral nutrients of the soil during germination of grain cultures have important effects on their further growth and productivity. Proper control of these conditions brings about significant improvements of the crops. The effects of environmental conditions during germination manifest themselves also in changes of pH, isoelectric point, redox potential, activity of catalase and peroxidase, and respiration rate of the plants. For instance, all these indicators were significantly lower in *Melilotus albus* germinated in acid soil and further grown in neutral soil than in control plants germinated and grown in neutral soil.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

402. Relatedness among Rhizobium and Agrobacterium species determined by three methods of nucleic acid hybridization

By Gibbins, Ann M.; Gregory, K. F.

From [Journal of Bacteriology \(1972\), 111\(1\), 129-41](#). Language: English, Database: CAPLUS

DNA was isolated from 20 strains of Rhizobium and Agrobacterium and from one strain of *Serratia marcescens*. The guanine plus cytosine content of each DNA sample was detd. by thermal denaturation. Radioactive DNA was isolated from three ref. strains following the uptake of [2-¹⁴C]-thymidine in the presence of deoxyadenosine. RNA polymerase was used to synthesize radioactive RNA on DNA templates from the three ref. strains. Radioactive DNA and RNA from the three ref. strains were each hybridized with filter-bound DNA from all of the 21 test strains in 6 × SSC (std. saline citrate) and 50% formamide at 43° for 40 hr. DNA/DNA relatedness was also detd. by spectrophotometric measurement of the rates of assocn. of single-stranded DNA. The order of relatedness between strains was similar by each method. Overall std. deviations for the DNA/DNA and DNA/RNA membrane filter techniques were ±0.87 and ±1.03%, resp.; that for the spectrophotometric technique was ±4.11%. The DNA/DNA membrane technique gave higher abs. values of hybridization than did the DNA/RNA technique. *R. leguminosarum* and *R. trifolii* could not be distinguished from each other by these techniques. These results also indicated close relations between *R. lupini* and *R. japonicum*, and (with less certainty) between *R. meliloti* and *R. phaseoli*. Of all the rhizobia tested against the *A. tumefaciens* 371 ref. strain, the *R. japonicum* strains were the most unrelated. The three Agrobacterium strains used were as related to the *R. lupini* and *R. leguminosarum* refs. as were several Rhizobium strains.

~3 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

403. Chemical weed control in potato

By Singh, Ranbir

From [Indian Journal of Agronomy \(1970\), 15\(1\), 67-71](#). Language: English, Database: CAPLUS

Potatoes, variety Up-to-Date, were treated preemergence with simazine (I) 0.25 kg/ha, I plus a postemergence herbicide, and postemergence herbicides. Combination of I with 1.08 kg propanil/ha, or 0.74 kg dalapon/ha, killed the same no. of weeds as I or sep. treatments of propanil, paraquat, and prometryne, 1.44, 0.40, and 0.25 kg/ha, resp. Tuber yield from mech. and chem. methods was greater than the unweeded control. The tests were on sandy loam, and the weeds controlled were *Phalaris minor*, *Polypogon monspeliensis*, *Anagallis arvensis*, *Chenopodium murale*, *Fumaria indica*, *Melilotus indica*, and *Coronopus didymus*.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

404. Degradation of 3,5-dinitro-o-cresol by Rhizobium and Azotobacter spp

By Hamdi, Yousef A.; Tewfik, Mohamed S.

From [Soil Biology & Biochemistry \(1970\), 2\(3\), 163-6](#). Language: English, Database: CAPLUS, DOI:10.1016/0038-0717(70)90003-9

Degradation of the herbicide 3,5-dinitro-o-cresol (DNOC) by 31 strains of *Rhizobium* and 5 strains of *Azotobacter* is reported. Tolerance of the herbicide in culture was greater for *R. trifolii*, *R. meliloti*, *R. leguminosarum*, *R. phaseoli*, *A. insignis*, *A. vinelandii*, *A. chroococcum*, and *Beijerinckia indica* [*A. indicus*] (250 ppm) than for *R. japonicum*, *R. lupini*, and cowpea (*Vigna sinensis*) rhizobia (25 ppm). Degradation of the herbicide varied from slight to almost complete. Growth of 3 strains of *R. leguminosarum* was stimulated by 250 ppm of DNOC. A prominent degradation product was identified chromatographically as 3-amino-5-nitro-o-cresol. Two other products were detected in 3-day cultures and 2 more appeared in 7-day cultures. The Rf values and optical d. max. for these unknown compds. are given. The results suggested that rhizobia degrade DNOC by a reductive pathway.

~6 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

405. Long-chain esters in clover wax

By Emery, A. E.; Gear, J. R.

From [Canadian Journal of Biochemistry](#) (1969), 47(12), 1195-7. Language: English, Database: CAPLUS, DOI:10.1139/o69-191

Chem. and spectral evidence indicates that a solid waxy material, isolated from the leaves and stems of *Melilotus alba* (sweet clover), is a mixt. of aliphatic esters. Vapor-phase chromatog. of the sapond. esters has shown that this fraction consists of esters of long-chain, satd. acids and alcs. contg. even nos. of C atoms. The acids vary in length from C16 to C30. The predominant alc. is C26, but significant amts. of C24 and C28 alcs. are also present.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

406. Polyacrylamide gel electrophoresis of cellular proteins of Cercospora isolates from some pasture legumes

By Peterson, Peter John; Latch, G. C. M.

From [New Zealand Journal of Science](#) (1969), 12(1), 3-12. Language: English, Database: CAPLUS

The protein band patterns of *Cercospora* isolates from pasture legume species were studied. The dried fungus was subjected to a protein extrn. process. The ext. was electrophoresed on polyacrylamide gels. The protein patterns were stained with Amido Black and comparisons were made of the following isolates: *Trifolium repens*, *T. pratense*, *T. dubium*, *T. subterraneum*, *T. glomeratum*, *Lotus pedunculatus*, *Melilotus indica*, *Medicago arabica*, *Medicago lupulina*. Limited variation in pattern was noted between isolates from many of the host species. Therefore, these isolates were probably all from 1 species of *Cercospora*.

~1 Citing

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

407. Ribonucleotide reductase from Rhizobium meliloti

By Cowles, Joe R.; Evans, Harold J.

From [Archives of Biochemistry and Biophysics](#) (1968), 127(1-3), 770-8. Language: English, Database: CAPLUS, DOI:10.1016/0003-9861(68)90288-9

Ribonucleotide reductase from *R. meliloti* was partially purified and characterized. The enzymic redn. of ribonucleotides to deoxyribonucleotides is dependent upon B12 coenzyme and reduced lipoic acid. Preliminary evidence indicated that exts. of *R. meliloti* contain thioredoxin and thioredoxin reductase which may function as a natural electron donor system for ribonucleotide redn. Certain guanosine, adenosine, and cytidine phosphates were effective substrates, but the uridine phosphates were reduced very slowly. There was a striking difference in the optimum concn. of the various ribonucleotides for enzyme activity. In general, the optimum substrate concns. of the ribonucleoside diphosphates were considerably less than those of the ribonucleoside tri- or monophosphates. The properties of the ribonucleotide reductase from *R. meliloti* were similar in many respects to those that have been described for the enzyme from *Lactobacillus leichmannii*. 33 references.

~3 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

408. Influence of microorganisms on the water stability of soil aggregates

By Molska, Irena

From [Roczniki Gleboznawcze](#) (1966), 16(1), 67-84. Language: Polish, Database: CAPLUS

The addn. of 1% of the slime produced by *Azotobacter chroococcum*, *Rhizobium leguminosarum*, *R. meliloti*, and *Beijerinckia indicum* causes a permanent increase in the water stability of soil aggregates (2-3 mm. diam.). An increase in the amt. of the microbiol. cells in the examd. soils does not affect the water stability of the aggregates.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

409. *Melilotate* hydroxylase. Purification of the enzyme and the nature of the prosthetic group

By Levy, Carl C.

From *Journal of Biological Chemistry* (1967), 242(4), 747-53. Language: English, Database: CAPLUS

Studies on highly purified *melilotate* hydroxylase indicate that FAD is the prosthetic group of the enzyme. The apoenzyme, found to be homogeneous by starch gel and disk electrophoresis, has a mol. wt. of ~65,000 as detd. by sucrose d. gradient centrifugation and Sephadex gel filtration. 30 references.

~3 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

410. *Melilotus indica*

By Durrani, Aziz A.; Ikram, Mohammed

From *Pakistan Journal of Scientific and Industrial Research* (1966), 9(2), 173-4. Language: English, Database: CAPLUS

The 95% alc. ext. of fresh *M. indica* was concd. under reduced pressure to a sirupy liquid, which was extd. with Et₂O; the aq. layer contained 10 sugars (by paper chromatography). Glucose, fructose, sorbose, raffinose, and cellobiose were identified. The Et₂O ext. was dried over anhyd. Na₂SO₄, filtered, and evapd., and the residue was taken up in petroleum ether (l) (discarding a small quantity of dark-brown insol. residue), concd., and adsorbed onto an alumina column. It was then eluted with l (4 fractions) and Me₂CO (2 fractions), and charcoal was added to the ether exts., which were then dried with anhyd. Na₂SO₄ and evapd. The 1st fraction was oily and was not characterized. The 2nd and 3rd fractions gave crystals m. 65°, which when crystd. from l gave needles m. 69° shown to be coumarin by mixed m.p., ir spectrum, and reactions. The 4th fraction on recrystn. gave colorless aggregate crystals m. 74-75° whose acetate deriv. m. 61° and yielded the alc. on hydrolysis. The Me₂CO fractions were evapd. giving a solid m. 132° which on recrystn. from l gave shining plates, m. 139°, of β-sitosterol.

~2 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

411. The relation of cobalt requirement to propionate metabolism in *Rhizobium*

By De Hertogh, A. A.; Mayeux, Patricia A.; Evans, Harold J.

From *Journal of Biological Chemistry* (1964), 239(8), 2446-53. Language: Unavailable, Database: CAPLUS

An investigation was conducted to det. biochem. sites at which Co, in the form of vitamin B₁₂ coenzyme, functions in the metabolism of legumes and their assocd. *Rhizobium* spp. Data are presented which indicate that propionate is oxidized by cell suspensions of bacteroids from soybean nodules and of *R. japonicum* and *R. meliloti*. The oxidn. of propionate by cell suspensions of *R. meliloti* was enhanced by the addn. of Na propionate, succinate, and methylmalonate to the culture medium, whereas, the addn. of these org. acids to the culture media of *R. japonicum* failed to produce this effect. The rate of propionate oxidn. by cell suspensions of *R. meliloti* grown with adequate Co was markedly greater than that of cells grown in a Co-deficient medium. The radiorespirometric patterns obtained by incubation of propionate labeled in specific positions with cell suspensions of *R. meliloti*, *R. japonicum*, and soybean bacteroids are consistent with expected patterns if propionate was converted to succinate via methylmalonate and was oxidized by the citric acid cycle. Cell-free exts. of *R. meliloti*, *R. japonicum*, and soybean bacteroids exhibit the capacity to catalyze the activation of propionate and acetate, the carboxylation of propionyl coenzyme A, and the conversion of methylmalonate to succinate. The methylmalonyl coenzyme A mutase in exts. of *R. meliloti* was easily inactivated by exposure of the exts. to direct light. Enzyme activity was restored by the addn. of dimethylbenzimidazolylcobamide or benzimidazolylcobamide coenzyme to the exts. but the adenylcobamide coenzyme was ineffective in restoring activity. Propionyl coenzyme A carboxylase activity in exts. of *R. meliloti* cells was not greatly affected by the concn. of Co in the medium in which cells were grown. In contrast, the activity of the methylmalonyl coenzyme A mutase in the exts. was strikingly influenced by the Co content of the culture medium. Methylmalonyl coenzyme A mutase activity, comparable to that obtained with exts. from cells grown with adequate Co, was obtained by the addn. of dimethylbenzimidazolylcobamide coenzyme to enzyme exts. of Co-deficient cells or to exts. of cells grown with 0.01 part/billion Co. It is concluded, therefore, that Co deficiency in *R. meliloti* prevents the synthesis of quantities of vitamin B₁₂ coenzyme adequate for the normal function of methylmalonyl coenzyme A mutase and that the inactive mutase results in the failure of the organism to oxidize propionate.

~4 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

412. Dicoumarol poisoning of cattle and sheep in South Australia

By Wignall, W. N.; Banks, A. W.; Hackett, E.; Irving, E. A.

From [Australian Veterinary Journal \(1961\)](#), **37(12)**, 456-9. Language: Unavailable, Database: CAPLUS, DOI:10.1111/j.1751-0813.1961.tb08701.x

Hay contg. 30% **Melilotus indica** caused dicoumarol poisoning to cattle and sheep fed on it during drought.

~1 Citing

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

413. Yield, chemical composition, and nutritive value of the legume **Melilotus indica**

By Singh, C. P.; Talapatra, S. K.

From [Indian Journal of Veterinary Science and Animal Husbandry \(1963\)](#), **33**, 63-70. Language: Unavailable, Database: CAPLUS

Av. of fodder from **M. indica** was 3710 kg./acre. The chem. compn. on a dry wt. basis was: crude protein 17.70, ether extractives 2.63, crude fiber 34.14, N-free ext. 35.03, carbohydrates 69.17, ash 10.50, Ca 0.82, P 0.29, Mg 0.38%. Protein digestibility of the green fodder was 79-82% while that of the dry matter was 76%.

~1 Citing

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

414. A synthetic nutrient culture for Rhizobium **meliloti**

By Ferry, P.; Blanchere, H.; Obaton, M.

From [Ann. Inst. Natl. Recherche Agron. \(1959\)](#), **10(Ser. A;2)**, 219-33. Language: Unavailable, Database: CAPLUS

A review of the nutrient requirements of Rhizobium **meliloti** S22 and exptl. results **indicate** that biotin alone is required for the growth of Rhizobium. The optimum concn. of mineral salts is detd. The compn. of a synthetic nutrient medium suitable also for other strains of **R. meliloti** is given as follows: KH_2PO_4 2.268 g., Na_2HPO_4 11.940, glucose 18, $(\text{NH}_4)_2\text{SO}_4$ 6.6, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ 78 mg., $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ 197, $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ 15, biotin 12 μ , and distd. H_2O to make 1000 ml. (pH 7.0).

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

415. Evaluation of seed galactomannans from legumes as paper sizes

By Tookey, H. L.; Ernst, A. J.; Lohmar, R. L.; Wolff, I. A.

From [Tappi \(1961\)](#), **44**, 910-12. Language: Unavailable, Database: CAPLUS

Seed galactomannans from *Crotalaria intermedia*, *C. spectabilis*, *Cassia emarginata*, *Trigonella foenum-graecum*, and **Melilotus indica** were tested as wet-end additives for softwood kraft and sulfide furnishes. The first three were generally equiv. to com. guar gum in improving burst, tensile, and fold properties of handsheets. The *T. foenum-graecum* and **M. indica** mucilages improved the strength characteristics of handsheets, but were not as effective as guar gum. All the galactomannans tested as surface sizes were as effective as guar or locust bean gums in improving the strength characteristics of a com. coating base.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

416. Amino acid composition of some leguminous fodder plants

By Tali, V.

From [Sbornik Nauch. Trudov Estonsk. Sel' skokhoz. Akad. \(1960\)](#), (No. 14), 198-204. Language: Unavailable, Database: CAPLUS

Results of paper chromatographic studies indicated that white sweet clover, red clover, and alfalfa contained glycine, serine, alanine, valine, leucine, isoleucine, proline, phenylalanine, cystine, cysteine, methionine, arginine, histidine, lysine, aspartic and glutamic acids, threonine, and tyrosine. The plants contained all the essential amino acids.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

417. Genetic blocks in the synthesis of coumarin in *Melilotus alba*

By Gorz, H. J.; Haskins, F. A.

From *Journal of Heredity* (1960), 51, 74-6. Language: Unavailable, Database: CAPLUS

The influence of the 2 genes, cu and b, on the level and form of coumarin in sweet clover leaf tissue was detd. by assaying 25 sweet clover plants of each of the 4 homozygous genotypes, CuCuBB, CuCubb, cucuBB, and cucubb. An assay of alfalfa leaves provided an indication of the magnitude of fluorescence not ascribable to coumarin. Approx. 0.2% total coumarin (dry-wt. basis) was found in plants homozygous for cu, which is 11.5 times the amt. found in alfalfa, but only about 1/20 of the level found in CuCu plants. Thus, the cu-effected block in coumarin synthesis is partial rather than complete. However, the action of the b gene in blocking the formation of free coumarin is virtually complete, as shown by the extremely low levels of free coumarin in bb plants. The probable relation of bound coumarin, free coumarin, and the cu and b genes is shown. Important implications in sweet clover breeding and in other studies are indicated.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

418. Gains and losses of mineral elements in an irrigated soil during a 20-year lysimeter investigation

By Pratt, P. F.; Chapman, H. D.

From *Hilgardia* (1961), 30, 445-67. Language: Unavailable, Database: CAPLUS, DOI:10.3733/hilg.v30n16p445

Some increase in soil N occurred under vetch and melilotus cover crops, indicating some N fixation by these crops. The increases under vetch averaged 131, 106, and 77 lb./acre/yr. with 0, 100, and 200 lbs./acre of added N. No significant change was observed under the cereal straw (500 lb./acre/yr.). No P was added, so the P loss of 15.9 lb./acre/yr. represented cropping depletion. Little or no P was found in the drainage H₂O. K was similarly depleted at a rate of 181 lb./acre/yr. Mg was added in the irrigation H₂O, and the removal of Mg was equally divided between crop removal and leaching. Addns. of Ca(NO₃)₂ markedly increased leaching loss of Mg. Na was also added in the irrigation H₂O; its accumulation equaled 69% of that added. Of the Na removed by crops 85% was taken up by 6 barley crops. Cl accumulated slowly, about 2% of that added, with barley and Sudan grass crops removing large amts. Some 1700 lb. of S was added per acre; the crops removed 290 lb., leaching removed 1070 lb., and 337 lb. accumulated in the soil. The actual accumulation was from 898 to minus 128 lb./acre, depending on treatment. For the 20-yr. period the av. Ca increase was 12,300 lb. as CaCO₃ equiv./acre. The av. CaCO₃ content at the end of the test was 10,550 lb./acre, or 86% of the Ca accumulated; the remainder went to raising the pH from less than 7 to around 8.

~1 Citing

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

419. Biosynthesis of coumarins

By Weygand, Friedrich; Wendt, Heinz

From *Zeitschrift fuer Naturforschung* (1959), 14b, 421-7. Language: Unavailable, Database: CAPLUS

Isolated cultures of sweet clover roots were used. Acetate-1-C¹⁴, with sugar, was not converted to coumarin (I). Uniformly labeled phenylalanine, however, formed I; and the whole C skeleton was used without change. With glucose-1-C¹⁴ a part of the C¹⁴ appeared in the benzene ring in I.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

420. High-protein green feeds of Uttar Pradesh. II. Neglected indigenous legume Morara (*Melilotus indica*) of Braj Bhumi

By Singh, C. P.; Ranjhan, S. K.; Nadgir, S. R.; Talapatra, S. K.

From *Indian Veterinary Journal* (1959), 36, 321-6. Language: Unavailable, Database: CAPLUS

cf. C.A. 54, 3784a. Chem. properties and nutritive value were detd. The legume contains a high amt. of digestible protein. The legume showed 1% Ca and 0.26% P, giving a favorably low Ca:P ratio.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

421. Metabolism of aromatic compounds in higher plants. I. Coumarin and o-coumaric acid

By Kosuge, T.; Conn, Eric E.

From *Journal of Biological Chemistry* (1959), 234, 2133-7. Language: Unavailable, Database: CAPLUS

Expts. in which intact plants and excised shoots of white sweet clover were exposed to C¹⁴O₂ indicate that coumarin is metabolically active in these tissues. Moreover, when radioactive coumarin was administered to excised clover shoots, it was rapidly converted to melilotyl glucoside, melilotic acid, and at least 2 other unidentified compds. Under the same conditions, radioactive o-coumaric acid was converted primarily to o-coumaryl glucoside, and in small amts. to coumarin, melilotic acid, melilotyl glucoside, and at least 2 other unidentified compds. Transcinnamic acid and phenylalanine, when administered to excised clover shoots, were effective precursors of o-coumaric acid. In addn., radioactive shikimic acid and glucose gave rise to labeled o-coumaric acid. Under the same conditions, none of these compds. except o-coumaric acid significantly labeled coumarin. The evidence presented indicates that the shikimic acid pathway functions in the biosynthesis of both coumarin and o-coumaric acid.

~6 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

422. The amino-acid pool and cellular leakage in intact cells of Rhizobium meliloti

By Jordan, D. C.

From *Canadian Journal of Microbiology* (1959), 5, 131-9. Language: Unavailable, Database: CAPLUS, DOI:10.1139/m59-017

Cells of R. meliloti (strain R₂₁) were found to contain an intracellular pool of amino acids. The passage of C¹⁴-histidine or C¹⁴-glutamate into this pool apparently occurred against a concn. gradient and was energy dependent. An internal bound form of C¹⁴, contg. a no. of radioactive amino acids was synthesized at the expense of radioactive pool components. This bound C¹⁴ consisted predominantly of several proteins whose syntheses were inhibited by chloramphenicol. Added histidine was not incorporated directly into this protein since the protein histidine was nonradioactive. When C¹⁴-labeled cells were suspended in glucose-contg. basal medium, there was an efflux of pool amino acids into the extracellular environment.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

423. Changes in total cation-exchange capacity in "Dumat" soil of Agra district by humifying the legumes zoonzhru (Melilotus indica), kanji (Pongamia glabra), and nonlegume, arousa (Justicia adhatoda)

By Nagar, B. R.; Bhattacharya, Abani K.

From *Agra Univ. J. Research* (1957), 6(Pt. 1), 15-18. Language: Unavailable, Database: CAPLUS

Total cation-exchange capacity of a soil depends on 3 factors: (1) clay-humus complex and physicochem. characteristics of its structure, (2) structure of the clay mineral, and (3) SiO₂/R₂O₃ ratio of the plant. For 16 weeks, the changes in total cation-exchange capacity in "Dumat" soil of Agra district assocd. with humification by plant material were independent of the leguminous or nonleguminous nature of the plants.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

424. Effect of hormone weed killers on weeds of the wheat field

By Pande, H. K.

From *Agr. Animal Husbandry Uttar Pradesh* (1952), 2(No. 7), 32-3. Language: Unavailable, Database: CAPLUS

Spray application of Agroxone (contg. 2-methyl-4-chloro-phenoxyacetic acid), Fernoxone (contg. 2,4-D Na salt), or 2,4-D gave 86-100% control of Chenopodium album, Asphodelus tenuifolius, Convolvulus arvensis, Melilotusindica, Anagallis arvensis, and Vicia sp. There was little observable effect on Cyperus rotundus. In all cases 2,4-D was superior to the other preps.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

425. Nutrient value of grasses

By Lincoln, R.

From [Mauritius, Department of Agriculture, Annual Report \(1948\)](#), p. 76. Language: Unavailable, Database: CAPLUS

[Melilotus indica](#), [Medicago denticulata](#), and [Vicia sativa](#) are compared with respect to contents of water, fat, fiber, protein, carbohydrate, ash, and P_2O_5 at different stages of growth.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

426. Science for the farmer (59th annual report)

By Lininger, F. F.

From [Pa. Agr. Expt. Sta., Bull. \(1946\)](#), 480, 66 pp.. Language: Unavailable, Database: CAPLUS

Research studies on the following subjects are briefly summarized: curabay-legume-grass silage palatability; wilting alfalfa to remove moisture for silage; penicillin injections for mastitis; alternate ice cream [sweeteners](#) and stabilizers; aging grating cheese; chromatates as sprays for potatoes; fertilization for roses; dormancy dust maintains cooking quality in potatoes; effect of temp. on stored canned foods; loss of vitamins in steam-blanching vegetables; thiamine in pork; legume hay in brood sow ration; Ladino [clover](#) pasture for pigs; high-protein mix better than tankage; for pigs; digestibility of nutrients affected by proportions of various ingredients; fat in food increases usefulness of entire diet; sulfa drugs for control of calf scours and pneumonia; grasses and legumes for orchard cover crops; foliar diagnosis [indicates](#) orchard fertilizer needs; detg. available soil K_2O by leaf analysis; type of clay in soil detns.; K_2O fertilizer needs; DDT for peach borer; heavy leaf loss lowers sugar content of grapes; DDT controls cherry flies; grape leafhoppers; grape berry moth; loss of vitamin A in chick-starter rations; vitamin D requirements of turkeys, pheasants, and quail; bone ash of male and female turkeys; sulfa drugs for control of coccidiosis; lime and P needs of worn-out soils; hen manure produces high crop yields; cacao shells improve soil for fine turf production; fertilization studies; starter solns. for tomato and cabbage; synthetic compost for mushrooms, DDT controls mushroom flies and symphylids; Ni-bearing compns. as fungicides; and cupric dinicotinamino fumarate decahydrate and 304 other org. compns. as insecticides.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

427. Carotene losses in freshly cut plant tissues

By Waugh, R. K.; Hauge, S. M.; Hilton, J. H.

From [Journal of Dairy Science \(1944\)](#), 27, 585-90. Language: Unavailable, Database: CAPLUS, DOI:10.3168/jds.S0022-0302(44)92636-6

Studies were made to det. the losses of carotene in freshly cut plant materials under conditions favorable to enzyme activity and under other conditions which inhibited enzyme action. Evidence is presented which [indicates](#) that the destruction of carotene due to enzymic activity is greater in alfalfa, red [clover](#), and [sweet clover](#) than in the oat plant, Kentucky blue grass, and brome grass. Other plants such as corn, soybeans, and lespedeza seem to have an intermediate enzyme activity. The enzyme appears to be aerobic in character. Although the carotene losses in wilted plant materials are related to enzyme activity, some nonenzymic destruction also occurs.

~3 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

428. Making organic matter effective in the soil

By Albrecht, Wm. A.

From [Ohio Vegetable & Potato Growers Assoc., Proc. \(1940\)](#), 25, 9-24. Language: Unavailable, Database: CAPLUS

A soil under fallow with single annual plowing, but no mech. losses or contributions, lost 115 lb. N per acre in 15 yr. Under rye cropping with the org. matter all turned under in the spring and fallowed, the loss was 640 lb. in 18 yr., but where cowpeas replaced the rye there was a gain of 120 lb. Where a 2.5-ton crop of red clover was turned under annually this soil gained 324 lb. N in 15 yr. Humus extd. from soils at the Missouri expt. station contained more than enough N, P and Ca to supply the needs of a normal corn crop on these soils. When the finer clay fraction (almost free of org. matter) of a soil was electrodyalized to remove exchangeable nutrients and then treated with known amts. of sp. nutrients (Ca, Mg, etc.), plant growth of 6 weeks or H₂CO₂ treatment for the same period failed to release addnl. significant amts. of Ca, Mg, K or other nutrients from this finer cryst. mineral fraction of the soil. This indicated the importance of decaying org. matter in supplying the nutrients necessary for plant growth on this soil. Studies on the use of sweet clover as a green manure on a limed soil in a 2-yr. rotation indicated the necessity for supplying K and possibly P fertilizer to the corn crop in the rotation. In other studies, treatment of field soils with mineral fertilizers reduced the level of org. matter in the soil, but did not prevent a high rate of decay of the org. matter or a high degree of effectiveness of the smaller remaining supply. Examples are given of the effect of mineral nutrients on the decompn. of soil org. matter under field and lab. conditions.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

429. Carotene in hay conserved by care in curing process

By Leonard, O. A.

From [Experiment Station Record \[U. S. Department of Agriculture\] \(1940\), 82\(No. 3\), 371](#). Language: Unavailable, Database: CAPLUS

A study of the distribution of carotene in different parts of alfalfa, soybean, sweet clover and Johnson grass plants indicated a relatively high content in the leaves, a much lower content in the upper part of the stems and still less in the lower part of the stems. The leaves made up less than 50% of the wt. of these plants, yet they contained over 90% of the total carotene. Data on the loss of carotene during the curing of these plants indicated that curing in the shade for from 24 to 30 hrs. resulted in a loss of 50 to 75% of the initial amount of carotene, while drying in the sun for the same period resulted in still greater losses. Similar losses occurred in crushed and uncrushed hays during field curing.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

430. Carotene in hay conserved by care in curing process

By Leonard, O. A.

From [Miss. Farm Res. \[Mississippi Sta.\] \(1939\), 2\(No. 11\), 2,7](#). Language: Unavailable, Database: CAPLUS

A study of the distribution of carotene in different parts of alfalfa, soybean, sweet clover and Johnson grass plants indicated a relatively high content in the leaves, a much lower content in the upper part of the stems and still less in the lower part of the stems. The leaves made up less than 50% of the wt. of these plants, yet they contained over 90% of the total carotene. Data on the loss of carotene during the curing of these plants indicated that curing in the shade for from 24 to 30 hrs. resulted in a loss of 50 to 75% of the initial amount of carotene, while drying in the sun for the same period resulted in still greater losses. Similar losses occurred in crushed and uncrushed hays during field curing.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

431. The alleged protective action of alfalfa against the hemorrhagic sweet-clover disease

By Smith, Wm. K.

From [Journal of Agricultural Research \(Washington, D. C.\) \(1939\), 59, 211-15](#). Language: Unavailable, Database: CAPLUS

cf. C. A. 32, 5043.1. Feeding expts. with rabbits gave no indication that sweet clover disease in livestock can be controlled by the inclusion of a small quantity of alfalfa in a diet of sweet-clover hay.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

432. Toxins of wilting

By Elpidina, O. K.

From *Compt. rend. acad. sci. U. R. S. S. [N. S.]* (1935), 3, 360-4. Language: Unavailable, Database: CAPLUS

cf. C. A. 27, 2979. Expts. with *Fusarium* preps. on tomato and sweet clover plants indicate that the wilting of plants attacked by fungi is caused by NH_3 resulting from the N metabolism of the parasitic organism.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

433. Fertilizer experiments with sweet clover

By Prince, F. S.; Blood, P. T.; Phillips, T. G.; Percival, G. P.

From *N. H. Agr. Expt. Sta., Circ.* (1935), 47, 1-12. Language: Unavailable, Database: CAPLUS

Lime and superphosphate increased yields but slightly when used alone, but when used together and when used separately and conjointly with manure, these increases were more than additive. K did not give significant increases in the crop at Greenland, but at Claremont K was the major limiting element in the growth of sweet clover. This is probably due to the inherent differences in quantities of native stocks of K in the 2 soils. Manure gave good increases in the crop at Claremont, but neither P, N nor adnl. lime increased yields to a significant extent. An attempt to grow sweet clover with basic slag as compared with lime and superphosphate indicated that equal results could be secured with less cost where the lime requirement was controlled by using ground limestone. Care in pasturing to avoid milk flavors is necessary with sweet clover, especially so where it is pastured alone.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

434. A chemical study of a soil under long-continued field experiments

By Snider, H. J.

From *Journal of the American Society of Agronomy* (1934), 26, 946-53. Language: Unavailable, Database: CAPLUS

The application of relatively large quantities of superphosphate, rock phosphate, and basic slag over a long period of years created in the surface soil a large supply of residual P. The P applied to the soil in the form of rock phosphate had at the end of a 27-year period a much higher soly. than superphosphate or basic slag phosphate. The penetration of applied P into the subsurface soil might be said to be negligible on the soil under consideration (Cisne silt loam). Eight tons of CaO increased the soly. of the native P in the soil, and Neubauer values indicated that it depressed the availability of rock phosphate and increased the availability of superphosphate and slag phosphate. Three tons of CaCO_3 applied over a relatively short period of years had but little effect on the soly. of the native P. The 8 tons of CaO depressed the availability of K_2O as detd. by the Neubauer method, and tended to give lower values for replaceable K_2O as detd. by the chem. method. The reaction of the untreated soil was pH 5.0; the soil to which 8 tons of CaO was added, 6.3-7.0, and that to which 3 tons had been applied 5.9-6.3. The various phosphates caused some variation in soil reaction. CaO applications increased the replaceable Ca values. Heavy CaO treatment showed little, if any, increase in replaceable Mg, while light CaO maintained the replaceable Mg values considerably above that of the untreated check. Total N and org. matter values were maintained at a slightly higher level on the soils with the light application of CaO as compared with the heavy application. The wheat grain yields and total P content of the grain from the unphosphated plots coincided with the P soly. values of the soils from these plots. The P content of the second year spring growth of sweet clover indicated that the heavy liming apparently aided the assimilation of P from superphosphate and basic slag and tended to depress the assimilation of P from rock phosphate.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

435. The influence of soil treatment upon the composition of sweet clover

By Snider, H. J.; Hein, M. A.

From *Journal of the American Society of Agronomy* (1934), 26, 740-5. Language: Unavailable, Database: CAPLUS

Sweet clover grown on a soil treated with combination of residues, CaO, P_2O_5 and K_2O contained throughout the season the greater wts. per acre of dry matter, N and K_2O and was below that grown on soils that received other treatments (CaO; CaO and P_2O_5 CaO and K_2O and residues, CaO and P_2O_5) in total amt. of P_2O_5 upon only a single date. The total N contained in the sweet clover varied from 106 lb. an acre on the CaO plant to 163 lb. on the plant that was treated with residues, CaO, P_2O_5 and K_2O . The P_2O_5 treatment increased the total amt. per acre of P_2O_5 from approx. 6.5 lb. on the unphosphated plants to a max. of approx. 20 lb. on the phosphated plants. K_2O treatment increased the max. amt. of K_2O to 102 lb. per acre compared to 30 lb. in the sweet clover without K_2O treatment. The ratio of roots to tops indicates that the sweet clover plant concentrates dry matter, N, P_2O_5 and K_2O in the roots during the fall and rapidly translocates these to the tops as growth progresses in the early spring. The max. amts. of these materials were found in the second year's growth of sweet clover from June 25 to July 21.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

436. Chemical weed killers-the chlorates of sodium and calcium

By Meadly, G. R. W.

From [Journal of the Department of Agriculture, Western Australia \(1933\)](#), 10, 481-7. Language: Unavailable, Database: CAPLUS

Spraying with a 15% soln. of NaClO₃ was effective in controlling pimpernel (*Anagallis* sp.), ant weed (*Chenopodium ambrosioides*), couch grass (*Cynodon dactylon*), summer grass (*Digitaria marginata*), barnyard millet (*Echinochloa colona*), burr trefoil (*Medicago denticulata*), King Island melilot (*Melilotus indica*), water cress (*Nasturtium officinale*), *Paspalum dilatatum*, rib grass (*Plantago major*), wire weed (*Polygonum aviculare*), beard grass (*Polypogon monspeliensis*), castor-oil plant (*Ricinus communis*), dock (*Rumex* sp.), nightshade (*Solanum nigrum*), milk thistle (*Sonchus oleracea*), chickweed (*Stellaria media*), wild violet (*Villarsia* sp.) and nut grass (*Cyperus* sp.). Blackberry was effectively controlled by spraying with 5-10% solns. but satisfactory control of the cape tulip (*Homeria collina* and *H. miniata*) was not obtained. In equiv. concns., NaClO₃ was more effective than Ca(ClO₃)₂.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

437. Effect of a diet of sweet clover on the calcium in the blood serum

By Cannon, C. Y.; Greenwood, Delbert

From [Journal of Dairy Science \(1930\)](#), 13, 424-31. Language: Unavailable, Database: CAPLUS, DOI:10.3168/jds.S0022-0302(30)93542-4

Certain physiol. differences obtained by feeding young rabbits the diets indicated are summarized as follows: (1) There was a decrease in serum Ca of young rabbits fed on an exclusive diet of sweet clover meal with distd. H₂O, while it remained fairly const. with rabbits fed alfalfa meal with distd. H₂O or a mixed diet of alfalfa meal, oats, cabbage or lettuce. When the alfalfa diet was resumed the serum Ca returned to normal. (2) Expts. indicate that the decline in serum Ca is linked with failure of blood to clot. (3) It is suggested that loss of serum Ca may raise the surface tension of the blood such that the blood platelets would fail to rupture, thus interfering with the formation of thrombin. (4) All 3 diets support regular growth.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

438. A study of microbiological activities in some Louisiana soils

By Abbott, E. V.

From [Bull. \(1926\)](#), 194, 25 pp.. Language: English, Database: CAPLUS

In a study of the fungous flora of 3 alluvial soils cropped to sugar cane and 1 loessial soil cropped to cotton, it was found that the genera *Aspergillus* and *Penicillium* constitute 50% of the total flora, 90% of all the fungi isolated belonged to the genera *Aspergillus*, *Penicillium*, *Spicaria*, *Trichoderma*, *Fusarium*, *Mucor*, *Rhizopus* and *Zygorrhynchus*. Members of 28 other genera were isolated. *Marasmius* and *Rhizoctonia*, which are known to be present in the soils studied, were isolated infrequently. The total nos. of micro.organisms were nearly twice as great in the cane soils as in the cotton soils. Sour clover (*Melilotus indica*) sown on plant cane and plowed under in the spring caused an increase in bacterial nos. which was evident throughout the year. The nos. of fungi and actinomycetes did not seem to be materially affected by this treatment. The sugar cane had a greater nitrifying capacity than the cotton soil, as measured by the nitrification of dried blood and (NH₄)₂SO₄. Plowing *Melilotus* into the soil caused an initial increase in nitrate accumulation, but apparently did not affect the nitrifying power of the soil. Application of 3 tons of ground oyster shells per acre to the cotton soil caused an increase in the nitrifying power of the soil. The non-symbiotic N-fixing power of the sugar cane soils was approx. twice as great as that of the cotton soil. *Azobacter* was plentiful in the cane soils but almost lacking in the cotton soil.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

439. Effect of certain calcium compounds and other substances on the yield and calcium content of some crops

By Shedd, O. M.

From [Soil Science \(1922\)](#), 14, 233-46. Language: Unavailable, Database: CAPLUS, DOI:10.1097/00010694-192210000-00001

A pot study on the effect of different Ca salts upon the yield of soy beans, [sweet clover](#), alfalfa and oats grown in rotation [indicates](#) that some Ky. soils do not have sufficient plant food Ca for optimum crop growth. Applications of Mg silicate reduced the Ca content of the hay and straw of all crops grown but appreciably increased the yield in many cases. The acidity of the soil was materially reduced in some cases but not sufficiently to account for all the increases in yield obtained.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

440. Chemistry of [sweet-clover](#) silage in comparison with alfalfa silage

By Swanson, C. O.; Tague, E. L.

From [Journal of Agricultural Research \(Washington, D. C.\) \(1918\)](#), 15, 113-32. Language: Unavailable, Database: CAPLUS

cf. C. A. 11, 2834. In milk bottle containers silage was made from alfalfa, [sweet-clover](#), and [sweet-clover](#) + ground corn 10:1. At intervals 3 samples were removed. Upon 1 detns. were made of loss of wt. and total H₂O content. The and sample was dild. with 4 times its wt. of H₂O and to the 3rd enough EtOH was added to make the EtOH content 50%, and the H₂O and EtOH extracts were used for detns. of: acidity as shown by titration with phenolphthalein and also by using the H electrode; amino N as shown by the method of Sorensen (Biochem. Z. 7, 45-101) and also by a modification of Sorensen's method using the H electrode to det. the end-point; total N; and total N not pptd. with phosphotungstic acid. The loss in wt. was approx. 1% on all samples. When titrated against phenolphthalein the alc. ext. showed higher acidity than the H₂O ext., but using the H electrode and titrating to p_H 8.3 the two exts. gave concordant results. The acidity of the 3 silages increased sharply for the 1st 15 days and then more gradually until about the 50th day; after this there was very little increase. The alfalfa required about twice as much alkali as the [sweet-clover](#) and the [clover](#) + corn had an acidity about midway between the two. The alfalfa silage was also higher in amino N than was the silage from the [sweet-clover](#), while the addition of corn to the [clover](#) had little effect. The total N was about twice the amino N in all cases. The results would [indicate](#) that silage can be made from [sweet-clover](#) more easily than from alfalfa.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

441. Analyses of Stock Foods and Victorian Native and Introduced Grasses

By Scott, P. R.

From [Rep. Dept. Agr. \(Victoria\) \(1910\)](#), 25-7. Language: Unavailable, Database: CAPLUS

The stock foods analyzed were maize meal, oat branning, malt combings, malt kiln dust, oat hulls, and molasses feeds. The grasses and forage plants included the following: *Pteris aquilina*, *Polygonum minus*, *P. aviculare*, *Plantago lanceolata*, *Sporobolus indicus*, *Anthisteria ciliata*, *Danthonia semiannularis*, *D. penicillata*, *Erharta stipoides*, *microlaena stipoides*, *Agrostis solandri* (Deyeuxia), *A. alba*, *Eragrostis brownii*, *E. pilosa*, *Melilotus officinalis*, *Eleusine germinata*, *Dichelachne crinita*, *Agropyrum scabium*, *Stipa setacea*, *Hemarthria compressa*, *Imperata arundinacea*, *Poa caespitosa*, *P. pratensis*, *Dactylis glomerata*, *Bromus unioloides*, *Lolium perenne*, *Stenotaphrum americanum*, *Cynodon dactylus*, *Panicum sanguinalis*, *Sataria vividis*, *Phalaris commutata*, *Pennisetum longistylum*, and *Paspalum dilatatum*.

~0 Citings

Copyright © 2015 American Chemical Society (ACS). All Rights Reserved.

442. Evidence that chlorinated auxin is restricted to the Fabaceae but not to the Fabaeae

By Lam Hong Kiat; McAdam Scott A M; McAdam Erin L; Ross John J

From [Plant physiology \(2015\)](#), , Language: English, Database: MEDLINE

Auxin is a pivotal plant hormone, usually occurring in the form of indole-3-acetic acid (IAA). However, in maturing pea seeds the level of the chlorinated auxin, 4-chloroindole-3-acetic acid (4-Cl-IAA), greatly exceeds that of IAA. A key issue is how plants produce halogenated compounds such as 4-Cl-IAA. To better understand this topic, we investigated the distribution of the chlorinated auxin. We show for the first time that 4-Cl-IAA is found in the seeds of *Medicago truncatula*, *Melilotus indicus* and three *Trifolium* species. Furthermore, we found no evidence that *Pinus* species synthesise 4-Cl-IAA in seeds, contrary to a previous report. The evidence [indicates](#) a single evolutionary origin of 4-Cl-IAA synthesis, in the Fabaceae, which may provide an ideal model system to further investigate the action and activity of halogenating enzymes in plants.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

[443. Rhizobial symbiosis effect on the growth, metal uptake, and antioxidant responses of Medicago lupulina under copper stress](#)

By Kong Zhaoyu; Mohamad Osama Abdalla; Deng Zhenshan; Liu Xiaodong; Glick Bernard R; Wei Gehong
From Environmental science and pollution research international (2015), , Language: English, Database: MEDLINE

The effects of rhizobial symbiosis on the growth, metal uptake, and antioxidant responses of *Medicago lupulina* in the presence of 200 mg kg⁻¹ Cu(2+) throughout different stages of symbiosis development were studied. The symbiosis with *Sinorhizobium meliloti* CCNWSX0020 induced an increase in plant growth and nitrogen content irrespective of the presence of Cu(2+). The total amount of Cu uptake of inoculated plants significantly increased by 34.0 and 120.4 % in shoots and roots, respectively, compared with non-inoculated plants. However, although the rhizobial symbiosis promoted Cu accumulation both in shoots and roots, the increase in roots was much higher than in shoots, thus decreasing the translocation factor and helping Cu phytostabilization. The rate of lipid peroxidation was significantly decreased in both shoots and roots of inoculated vs. non-inoculated plants when measured either 8, 13, or 18 days post-inoculation. In comparison with non-inoculated plants, the activities of superoxide dismutase and ascorbate peroxidase of shoots of inoculated plants exposed to excess Cu were significantly elevated at different stages of symbiosis development; similar increases occurred in the activities of superoxide dismutase, catalase, and glutathione reductase of inoculated roots. The symbiosis with *S. meliloti* CCNWSX0020 also upregulated the corresponding genes involved in antioxidant responses in the plants treated with excess Cu. The results indicated that the rhizobial symbiosis with *S. meliloti* CCNWSX0020 not only enhanced plant growth and metal uptake but also improved the responses of plant antioxidant defense to excess Cu stress.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

[444. Effect of Melilotus extract on lung injury via the upregulation of tumor necrosis factor- \$\alpha\$ -induced protein-8-like 2 in septic mice](#)

By Liu Ming-Wei; Wang Yun-Hui; Qian Chuan-Yun; Su Mei-Xian
From Molecular medicine reports (2015), 11(3), 1675-84, Language: English, Database: MEDLINE

As a Traditional Chinese Medicine, *Melilotus* extracts have been reported to function as an anti-inflammatory agent, antioxidant and inhibitor of capillary permeability. The present study aimed to identify the mechanisms by which *Melilotus* interferes with inflammation-associated and oxidative stress pathways during sepsis. An animal model of cecal ligation-perforation (CLP)-induced sepsis was established. Two hours prior to surgery, animals in the treatment group were administered 25 mg/kg *Melilotus* extract tablets and subsequently every 8 h. At 24 h post-administration, pathological modifications in lung tissue and expression levels of tumor necrosis factor- α -induced protein-8-like 2 (TIPE2) expression, nuclear factor (NF)- κ B, toll-like receptor 4 (TLR4), heme oxygenase-1 (HO-1), inhibitor of κ B kinase (I κ B), pro-inflammatory mediators (interleukin-6 and tumor necrosis factor- α), myeloperoxidase (MPO), malondialdehyde (MDA) and superoxide dismutase (SOD), were examined. The results showed that *Melilotus* extract had a marked effect on the pathological manifestation of lung tissue and lung inflammatory response, the upregulation of TIPE2, HO-1 and I κ B expression, and the inhibition of TLR4 and NF- κ B activities. In addition, following treatment with *Melilotus* extract, the model animals demonstrated decreased levels of MPO and MDA as well as increased levels of SOD. In conclusion, these results indicated that *Melilotus* extract may be a potential therapeutic agent for the treatment of CLP-induced lung injury, the mechanism of which proceeded via inflammation- and oxidation-associated pathways by increasing TIPE2 expression.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

[445. Functional characterization of the CDF transporter SMc02724 \(SmYiiP\) in Sinorhizobium meliloti: Roles in manganese homeostasis and nodulation](#)

By Raimunda Daniel; Elso-Berberian Graciela
From Biochimica et biophysica acta (2014), 1838(12), 3203-11, Language: English, Database: MEDLINE

In bacteria, membrane transporters of the cation diffusion facilitator (CDF) family participate in Zn(2+), Fe(2+), Mn(2+), Co(2+) and Ni(2+) homeostasis. The functional role during infection processes for several members has been shown to be linked to the specificity of transport. *Sinorhizobium meliloti* has two homologous CDF genes with unknown transport specificity. Here we evaluate the role played by the CDF SMc02724 (SmYiiP). The deletion mutant strain of SmYiiP (Δ smyiiP) showed reduced in vitro growth fitness only in the presence of Mn(2+). Incubation of Δ smyiiP and WT cells with sub-lethal Mn(2+) concentrations resulted in a 2-fold increase of the metal only in the mutant strain. Normal levels of resistance to Mn(2+) were attained by complementation with the gene SMc02724 under regulation of its endogenous promoter. In vitro, liposomes with incorporated heterologously expressed pure protein accumulated several transition metals. However, only the transport rate of Mn(2+) was increased by imposing a transmembrane H(+) gradient. Nodulation assays in alfalfa plants showed that the strain Δ smyiiP induced a lower number of nodules than in plants infected with the WT strain. Our results indicate that Mn(2+) homeostasis in *S. meliloti* is required for full infection capacity, or nodule function, and that the specificity of transport in vivo of SmYiiP is narrowed down to Mn(2+) by a mechanism involving the proton motive force.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

446. Effect of *melilotus* extract on lung injury by upregulating the expression of cannabinoid CB2 receptors in septic rats

By Liu Ming-wei; Su Mei-xian; Wang Yun-hui; Wei Wei; Qin Lan-fang; Liu Xu; Tian Mao-li; Qian Chuan-yun
From BMC complementary and alternative medicine (2014), 1494, Language: English, Database: MEDLINE

BACKGROUND: *M. Suaveolens* Ledeb has long been used in China to treat inflammatory infectious diseases. *Melilotus* is extracted from *Melilotus Suaveolens* Ledeb and its therapeutic potential is associated with its anti-inflammatory activity. However, the precise mechanisms underlying its effects are unknown. This study was conducted to evaluate the protective effects of *melilotus* extract in a rat cecal ligation and puncture (CLP)-induced animal model of acute lung injury (ALI). **METHODS:** A sepsis model was induced by CLP-like lung inflammation. Two hours prior to CLP administration, the treatment group was administered *melilotus* extract via oral injection. RT-PCR and Western blotting were used to test the expression of cannabinoid receptor (CB)2, NF- κ B and I κ B from single peripheral blood mononuclear cells and lung tissues respectively. Enzyme linked immune sorbent assay was used to detect serum levels of tumor necrosis factor (TNF)- α , interleukin (IL)-6, IL-10, and IL-12. The numbers of neutrophils, lymphocytes, macrophages and total cells in the bronchoalveolar lavage (BAL) fluid were counted. For histologic analysis, hematoxylin and eosin (H&E) stains were evaluated. **RESULTS:** After inducing ALI by CLP for 24 hours, *melilotus* extract up-regulated peripheral blood mononuclear cell CB2 expression, blocked the activity of NF- κ B65, and the number of neutrophils, lymphocytes and total cells were significantly lower in the *melilotus* extract group than the control group. In addition, TNF- α and IL-6 levels were significantly decreased in the *melilotus* extract group. Histological results demonstrated the attenuation effect of *melilotus* extract on CLP-induced lung inflammation. CB2 was negatively correlated to NF- κ B mRNA and proteins, respectively ($r = -0.377$, $P < 0.05$; $r = -0.441$, $P < 0.05$). **CONCLUSION:** The results of this study indicated *melilotus* extract significantly reduced CLP-induced lung inflammation by up-regulating CB2 expression. The remarkable protective effects of *melilotus* extract suggest its therapeutic potential in CLP induced-acute lung injury treatment.

~1 Citing

Copyright © 2015 U.S. National Library of Medicine.

447. Central role for RNase YbeY in Hfq-dependent and Hfq-independent small-RNA regulation in bacteria

By Pandey Shree P; Winkler Jonathan A; Li Hu; Camacho Diogo M; Collins James J; Walker Graham C
From BMC genomics (2014), 15121, Language: English, Database: MEDLINE

BACKGROUND: Conceptual parallels exist between bacterial and eukaryotic small-RNA (sRNA) pathways, yet relatively little is known about which protein may recognize and recruit bacterial sRNAs to interact with targets. In eukaryotes, Argonaute (AGO) proteins discharge such functions. The highly conserved bacterial YbeY RNase has structural similarities to the MID domain of AGOs. A limited study had indicated that in *Sinorhizobium meliloti* the YbeY ortholog regulates the accumulation of sRNAs as well as the target mRNAs, raising the possibility that YbeY may play a previously unrecognized role in bacterial sRNA regulation. **RESULTS:** We have applied a multipronged approach of loss-of-function studies, genome-wide mRNA and sRNA expression profiling, pathway analysis, target prediction, literature mining and network analysis to unravel YbeY-dependent molecular responses of *E. coli* exposed to hydroxyurea (HU). Loss of ybeY function, which results in a marked resistance to HU, had global effects on sRNA-mediated gene expression. Of 54 detectable *E. coli* sRNAs in our microarray analysis, 30 sRNAs showed a differential expression upon HU stress, of which 28 sRNAs displayed a YbeY-dependent change in expression. These included 12 Hfq-dependent and 16 Hfq-independent sRNAs. We successfully identified at least 57 experimentally inferred sRNA-mRNA relationships. Further applying a 'context likelihood of relatedness' algorithm, we reverse engineered the YbeY-dependent Hfq-dependent sRNA-mRNA network as well as YbeY-dependent Hfq-independent sRNA-mRNA network. **CONCLUSION:** YbeY extensively modulates Hfq-dependent and independent sRNA-mRNA interactions. YbeY-dependent sRNAs have central roles in modulating cellular response to HU stress.

~2 Citings

Copyright © 2015 U.S. National Library of Medicine.

[448. Study of alpha-amylase and urease inhibitory activities of *Melilotus indicus* \(Linn.\) All](#)

By Ahmed Dildar; Younas Saba; Anwer-Mughal Qaria Mumtaz

From *Pakistan journal of pharmaceutical sciences* (2014), 27(1), 57-61, Language: English, Database: MEDLINE

Melilotus indicus (Linn.) All. is a small herb distributed throughout Pakistan and has a number of ethnomedicinal uses. It is also consumed as a vegetable. In the present work, we are reporting the alpha-amylase and urease inhibitory activities of methanolic extract of *M. indicus* and its sub-fractions in different solvents. Both the methanolic extract and its fractions in chloroform, ethyl acetate, n-butanol and water showed remarkable inhibitory activities against alpha-amylase with the IC₅₀ values being 1.29, 1.45, 1.07, 1.45 and 2.10 mg/mL respectively. The efficacy of the methanolic extract was comparable with that of acarbose (1.20 mg/mL), while the ethyl acetate fraction was more potent. The urease inhibitory activities of methanolic extract and chloroform, ethyl acetate, n-butanol and water fractions were more prominent with IC₅₀ values being 0.95, 0.89, 1.53, 0.98 and 4.90 µg/mL respectively. The activity of methanolic extract was slightly higher than that of thiourea (0.97 µg/mL) which in turn was slightly higher than that of n-butanolic fraction. The chloroform fraction showed the highest anti-urease activity. All the plant samples showed enzyme inhibitory activity in a dose-dependent manner. Moreover, they were manifold more effective against urease than alpha-amylase. The combination of the plant extract with acarbose considerably increased the potency of the latter. The findings suggest that enzyme inhibitory activities of the vegetable *M. indicus* may have pharmacological significance against diabetes mellitus and gastrointestinal ulcers.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

[449. Perspectives on allelopathy in mexican traditional agroecosystems: A case study in tlaxcala](#)

By Anaya A L; Ramos L; Cruz R; Hernandez J G; Nava V

From *Journal of chemical ecology* (1987), 13(11), 2083-101, Language: English, Database: MEDLINE

Agroecosystems in Tlaxcala, Mexico, are surrounded by trees and water channels and have a great variety of cultivated and noncultivated plants. The main results of a study carried out on a traditional agroecosystem in Santa Ines, Tlaxcala are presented. Some ecological aspects of polycultures, plant covers (dry leaves of *Alnus firmifolia*, *Berula erecta*, and *Juncus* sp.), and the allelopathic potential of crops and noncultivated plants (fresh and dry material) were analyzed. The main plants (trees, shrubs, and herbs) present in the agroecosystem were identified. The total number of weeds in plots where plant covers were added was reduced. The number of nodules of *Rhizobium phaseoli* and the production of bean and squash increased with plant covers. Corn, beans, and squash showed a clear allelopathic effect, as well as *Chenopodium murale*, *Tradescantia crassifolia*, *Melilotus indicus*, and *Amaranthus hybridus*, among other weeds. The contribution of allelopathy in studies of traditional agroecosystems is of great importance for the management of species in space and time. Allelopathy can be the basis of biological control of pests and weeds and of the discovery of new useful substances.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

[450. Enhanced nodule initiation on alfalfa by wild-type *Rhizobium meliloti* co-inoculated with nod gene mutants and other bacteria](#)

By Caetano-Anolles G; Bauer W D

From *Planta* (1988), 174(3), 385-95, Language: English, Database: MEDLINE

Nodule formation on alfalfa (*Medicago sativa* L.) roots was determined at different inoculum dosages for wild-type *Rhizobium meliloti* strain RCR2011 and for various mutant derivatives with altered nodulation behavior. The number of nodules formed on the whole length of the primary roots was essentially constant regardless of initial inoculum dosage or subsequent bacterial multiplication, **indicative** of homeostatic regulation of total nodule number. In contrast, the number of nodules formed in just the initially susceptible region of these roots was sigmoidally dependent on the number of wild-type bacteria added, increasing rapidly at dosages above 5·10³ bacteria/plant. This behavior **indicates** the possible existence of a threshold barrier to nodule initiation in the host which the bacteria must overcome. When low dosages of the parent (10³ cells/plant) were co-inoculated with 10⁶ cells/plant of mutants lacking functional *nodA*, *nodC*, *nodE*, *nodF* or *nodH* genes, nodule initiation was increased 10- to 30-fold. Analysis of nodule occupancy **indicated** that these mutants were able to help the parent (wild-type) strain initiate nodules without themselves occupying the nodules. Co-inoculation with *R. trifolii* or *Agrobacterium tumefaciens* cured of its Ti plasmid also markedly stimulated nodule initiation by the *R. meliloti* parent strain. Introduction of a segment of the symbiotic megaplasmid from *R. meliloti* into *A. tumefaciens* abolished this stimulation. *Bradyrhizobium japonicum* and a chromosomal Tn5 *nod(-)* mutant of *R. meliloti* did not significantly stimulate nodule initiation when co-inoculated with wild-type *R. meliloti*. These results **indicate** that certain *nod* gene mutants and members of the *Rhizobiaceae* may produce extracellular "signals" that supplement the ability of wild-type *R. meliloti* cells to induce crucial responses in the host.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

451. The *Sinorhizobium meliloti* LysR family transcriptional factor LsrB is involved in regulation of glutathione biosynthesis

By Lu Dawei; Tang Guirong; Wang Dong; Luo Li

From *Acta biochimica et biophysica Sinica* (2013), 45(10), 882-8, Language: English, Database: MEDLINE

Glutathione, a key antioxidant in *Sinorhizobium meliloti*, is required for the development of alfalfa (*Medicago sativa*) nitrogen-fixing nodules. This tripeptide can be synthesized by both γ -glutamyl cysteine synthetase (GshA) and glutathione synthetase (GshB) in *Escherichia coli* and *S. meliloti*. Genetic evidence has **indicated** that the null mutant of *S. meliloti* *gshA* or *gshB1* does not establish efficient symbiosis on alfalfa. However, the transcriptional regulation of *gshA* and *gshB* has not been well understood. Here, *S. meliloti* LsrB, a member of LysR family transcriptional factors, was found to positively regulate glutathione biosynthesis by activating the transcription of *gshA* and *gshB1* under both free-living and symbiotic conditions. The decrease in glutathione production in the LsrB in-frame deletion mutant (LsrB1-2) was determined by using quadrupole time-of-flight liquid chromatography-mass spectrometry. The expression of *gshA* and *gshB1* was correspondingly reduced in the mutant under free-living and symbiotic conditions by analyses of real-time quantitative reverse transcription-polymerase chain reaction and promoter-GUS fusions. Interestingly, LsrB positively regulated the transcription of *oxyR*, which encodes another member of LysR family regulators and responds to oxidative stresses in *S. meliloti*. The *oxyR* null mutant produced less glutathione, in which the transcription of *gshA* was consistently down-regulated. These findings demonstrate that glutathione biosynthesis is positively regulated by both LsrB and *OxyR* in *S. meliloti*.

~1 Citing

Copyright © 2015 U.S. National Library of Medicine.

452. Assessing genotypic diversity and symbiotic efficiency of five rhizobial legume interactions under cadmium stress for soil phytoremediation

By Guefrachi I; Rejili M; Mahdhi M; Mars M

From *International journal of phytoremediation* (2013), 15(10), 938-51, Language: English, Database: MEDLINE

In the framework of soil phytoremediation using local legume plants coupled with their native root-nodulating bacteria to increase forage yields and preserve contaminated soils in arid regions of Tunisia, we investigated the diversity of bacteria from root nodules of *Lathyrus sativus*, *Lens culinaris*, *Medicago marina*, *M. truncatula*, and *M. minima* and the symbiotic efficiency of these five legume symbiosis under Cadmium stress. Fifty bacterial strains were characterized using physiological and biochemical features such heavy metals resistant, and PCR-RFLP of 16S rDNA. Taxonomically, the isolates nodulating *L. sativus*, and *L. culinaris* are species within the genera *Rhizobium* and the ones associated to *Medicago* sp, within the genera *Sinorhizobium*. The results revealed also that the cadmium tolerance of the different legumes-rhizobia interaction was as follows: *M. minima* < *M. truncatula* < *M. marina* < *L. sativus* < *L. culinaris* **indicating** that the effect of Cadmium on root nodulation and biomass production is more deleterious on *M. minima*-*S. meliloti* and *M. truncatula*-*S. meliloti* than in other symbiosis. Knowledge on genetic and functional diversity of *M. marina*, *L. sativus* and *L. culinaris* microsymbiotes is very useful for inoculant strain selection and can be selected to develop inoculants for soil phytoremediation.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

453. Bioautography-guided isolation of antibacterial compounds of essential oils from Thai spices against histamine-producing bacteria

By Lomarat Pattamapan; Phanthong Phanida; Wongsariya Karn; Chomnawang Mullika Traidej; Bunyapraphatsara Nuntavan

From *Pakistan journal of pharmaceutical sciences* (2013), 26(3), 473-7, Language: English, Database: MEDLINE

The outbreak of histamine fish poisoning has been being an issue in food safety and international trade. The growth of contaminated bacterial species including *Morganella morganii* which produce histidine decarboxylase causes histamine formation in fish during storage. Histamine, the main toxin, causes mild to severe allergic reaction. At present, there is no well-established solution for histamine fish poisoning. This study was performed to determine the antibacterial activity of essential oils from Thai spices against histamine-producing bacteria. Among the essential oils tested, clove, lemongrass and sweet basil oils were found to possess the antibacterial activity. Clove oil showed the strongest inhibitory activity against *Morganella morganii*, followed by lemongrass and sweet basil oils. The results indicated that clove, lemongrass and sweet basil oils could be useful for the control of histamine-producing bacteria. The attempt to identify the active components using preparative TLC and GC/MS found eugenol, citral and methyl chavicol as the active components of clove, lemongrass and sweet basil oils, respectively. The information from this study would be useful in the research and development for the control of histamine-producing bacteria in fish or seafood products to reduce the incidence of histamine fish poisoning.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

454. Queuosine biosynthesis is required for sinorhizobium meliloti-induced cytoskeletal modifications on HeLa Cells and symbiosis with *Medicago truncatula*

By Marchetti Marta; Capela Delphine; Poincloux Renaud; Benmeradi Nacer; Auriac Marie-Christine; Le Ru Aurelie; Maridonneau-Parini Isabelle; Batut Jacques; Masson-Boivin Catherine

From *PloS one* (2013), 8(2), e56043, Language: English, Database: MEDLINE

Rhizobia are symbiotic soil bacteria able to intracellularly colonize legume nodule cells and form nitrogen-fixing symbiosomes therein. How the plant cell cytoskeleton reorganizes in response to rhizobium colonization has remained poorly understood especially because of the lack of an in vitro infection assay. Here, we report on the use of the heterologous HeLa cell model to experimentally tackle this question. We observed that the model rhizobium *Sinorhizobium meliloti*, and other rhizobia as well, were able to trigger a major reorganization of actin cytoskeleton of cultured HeLa cells in vitro. Cell deformation was associated with an inhibition of the three major small RhoGTPases Cdc42, RhoA and Rac1. Bacterial entry, cytoskeleton rearrangements and modulation of RhoGTPase activity required an intact *S. meliloti* biosynthetic pathway for queuosine, a hypermodified nucleoside regulating protein translation through tRNA, and possibly mRNA, modification. We showed that an intact bacterial queuosine biosynthetic pathway was also required for effective nitrogen-fixing symbiosis of *S. meliloti* with its host plant *Medicago truncatula*, thus indicating that one or several key symbiotic functions of *S. meliloti* are under queuosine control. We discuss whether the symbiotic defect of que mutants may originate, at least in part, from an altered capacity to modify plant cell actin cytoskeleton.

~3 Citings

Copyright © 2015 U.S. National Library of Medicine.

455. Insights into the noncoding RNome of nitrogen-fixing endosymbiotic α -proteobacteria

By Jimenez-Zurdo Jose I; Valverde Claudio; Becker Anke

From *Molecular plant-microbe interactions : MPMI* (2013), 26(2), 160-7, Language: English, Database: MEDLINE

Symbiotic chronic infection of legumes by rhizobia involves transition of invading bacteria from a free-living environment in soil to an intracellular state as differentiated nitrogen-fixing bacteroids within the nodules elicited in the host plant. The adaptive flexibility demanded by this complex lifestyle is likely facilitated by the large set of regulatory proteins encoded by rhizobial genomes. However, proteins are not the only relevant players in the regulation of gene expression in bacteria. Large-scale high-throughput analysis of prokaryotic genomes is evidencing the expression of an unexpected plethora of small untranslated transcripts (sRNAs) with housekeeping or regulatory roles. sRNAs mostly act in response to environmental cues as post-transcriptional regulators of gene expression through protein-assisted base-pairing interactions with target mRNAs. Riboregulation contributes to fine-tune a wide range of bacterial processes which, in intracellular animal pathogens, largely compromise virulence traits. Here, we summarize the incipient knowledge about the noncoding RNome structure of nitrogen-fixing endosymbiotic bacteria as inferred from genome-wide searches for sRNA genes in the alfalfa partner *Sinorhizobium meliloti* and further comparative genomics analysis. The biology of relevant *S. meliloti* RNA chaperones (e.g., Hfq) is also reviewed as a first global indicator of the impact of riboregulation in the establishment of the symbiotic interaction.

~1 Citings

Copyright © 2015 U.S. National Library of Medicine.

456. Pharmacognostical studies on *melilotus indica* all leaf

By Kshetrapal S; Rudra S; Nag A

From *Ancient science of life* (1985), 4(4), 220-3, Language: English, Database: MEDLINE

The present study deals with the pharmacognostic studies on the leaves of *Melilotus indica*. The drug shows the presence of tannins, Xanthoprotein, starch, cystine, sterols, triterpenoids, reducing sugars, saponins and alkaloids.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

457. Denitrification in *Sinorhizobium meliloti*

By Torres Maria J; Rubia Maria I; Bedmar Eulogio J; Delgado Maria J

From *Biochemical Society transactions* (2011), 39(6), 1886-9, Language: English, Database: MEDLINE

Denitrification is the complete reduction of nitrate or nitrite to N₂, via the intermediates nitric oxide (NO) and nitrous oxide (N₂O), and is coupled to energy conservation and growth under O₂-limiting conditions. In *Bradyrhizobium japonicum*, this process occurs through the action of the napEDABC, nirK, norCBQD and nosRZDFYLX gene products. DNA sequences showing homology with nap, nirK, nor and nos genes have been found in the genome of the symbiotic plasmid pSymA of *Sinorhizobium meliloti* strain 1021. Whole-genome transcriptomic analyses have demonstrated that *S. meliloti* denitrification genes are induced under micro-oxic conditions. Furthermore, *S. meliloti* has also been shown to possess denitrifying activities in both free-living and symbiotic forms. Despite possessing and expressing the complete set of denitrification genes, *S. meliloti* is considered a partial denitrifier since it does not grow under anaerobic conditions with nitrate or nitrite as terminal electron acceptors. In the present paper, we show that, under micro-oxic conditions, *S. meliloti* is able to grow by using nitrate or nitrite as respiratory substrates, which indicates that, in contrast with anaerobic denitrifiers, O₂ is necessary for denitrification by *S. meliloti*. Current knowledge of the regulation of *S. meliloti* denitrification genes is also included.

~3 Citings

Copyright © 2015 U.S. National Library of Medicine.

458. Evidences of autoregulation of hfq expression in *Sinorhizobium meliloti* strain 2011

By Sobrero Patricio; Valverde Claudio

From *Archives of microbiology* (2011), 193(9), 629-39, Language: English, Database: MEDLINE

Riboregulation comprises gene expression regulatory mechanisms that rely upon the activity of small non-coding RNAs (sRNAs) and in most cases RNA binding proteins. In γ -proteobacteria, the Sm-like protein Hfq is a key player in riboregulatory processes, because it promotes sRNA-mRNA interactions and influences mRNA polyadenylation or translation. In the α -proteobacterium *Sinorhizobium meliloti*, the large number of detected small RNA transcripts and the pleiotropic effects of hfq mutations lead to the hypothesis that riboregulatory mechanisms are important in this soil microorganism to adjust gene expression both in free-living conditions and as a nitrogen-fixing endosymbiont within legume root nodules. In this study, homology modeling of *S. meliloti* Hfq protein and cross-complementation experiments of *S. meliloti* and *Escherichia coli* mutants indicates that hfq (Sm) encodes an RNA chaperone that can be functionally exchanged by its homolog from *E. coli*. A transcriptional and translational analysis of *S. meliloti* hfq expression by means of lacZ reporter fusions strongly suggests that the *S. meliloti* Hfq protein autocontrols its expression at the translational level, a phenomenon that was evident in the natural host *S. meliloti* as well as in the heterologous host *E. coli*.

~6 Citings

Copyright © 2015 U.S. National Library of Medicine.

459. The replication origin of a repABC plasmid

By Cervantes-Rivera Ramon; Pedraza-Lopez Francisco; Perez-Segura Gabriela; Cevallos Miguel A
From *BMC microbiology* (2011), 11158, Language: English, Database: MEDLINE

BACKGROUND: repABC operons are present on large, low copy-number plasmids and on some secondary chromosomes in at least 19 α -proteobacterial genera, and are responsible for the replication and segregation properties of these replicons. These operons consist, with some variations, of three genes: repA, repB, and repC. RepA and RepB are involved in plasmid partitioning and in the negative regulation of their own transcription, and RepC is the limiting factor for replication. An antisense RNA encoded between the repB-repC genes modulates repC expression. **RESULTS:** To identify the minimal region of the *Rhizobium etli* p42d plasmid that is capable of autonomous replication, we amplified different regions of the repABC operon using PCR and cloned the regions into a suicide vector. The resulting vectors were then introduced into *R. etli* strains that did or did not contain p42d. The minimal replicon consisted of a repC open reading frame under the control of a constitutive promoter with a Shine-Dalgarno sequence that we designed. A sequence analysis of repC revealed the presence of a large A+T-rich region but no iterons or DnaA boxes. Silent mutations that modified the A+T content of this region eliminated the replication capability of the plasmid. The minimal replicon could not be introduced into *R. etli* strain containing p42d, but similar constructs that carried repC from *Sinorhizobium meliloti* pSymA or the linear chromosome of *Agrobacterium tumefaciens* replicated in the presence or absence of p42d, indicating that RepC is an incompatibility factor. A hybrid gene construct expressing a RepC protein with the first 362 amino acid residues from p42d RepC and the last 39 amino acid residues of RepC from SymA was able to replicate in the presence of p42d. **CONCLUSIONS:** RepC is the only element encoded in the repABC operon of the *R. etli* p42d plasmid that is necessary and sufficient for plasmid replication and is probably the initiator protein. The oriV of this plasmid resides within the repC gene and is located close to or inside of a large A+T region. RepC can act as an incompatibility factor, and the last 39 amino acid residues of the carboxy-terminal region of this protein are involved in promoting this phenotype.

~2 Citings

Copyright © 2015 U.S. National Library of Medicine.

460. Nitric oxide is required for an optimal establishment of the *Medicago truncatula*-*Sinorhizobium meliloti* symbiosis

By del Giudice Jennifer; Cam Yvan; Damiani Isabelle; Fung-Chat Franck; Meilhoc Eliane; Bruand Claude; Brouquisse Renaud; Puppo Alain; Boscardi Alexandre
From *The New phytologist* (2011), 191(2), 405-17, Language: English, Database: MEDLINE

Nitric oxide (NO) is a gaseous molecule that participates in numerous plant signalling pathways. It is involved in plant responses to pathogens and development processes such as seed germination, flowering and stomatal closure. Using a permeable NO-specific fluorescent probe and a bacterial reporter strain expressing the lacZ gene under the control of a NO-responsive promoter, we detected NO production in the first steps, during infection threads growth, of the *Medicago truncatula*-*Sinorhizobium meliloti* symbiotic interaction. Nitric oxide was also detected, by confocal microscopy, in nodule primordia. Depletion of NO caused by cPTIO (2-(4-carboxyphenyl)-4,4,5,5-tetramethyl imidazoline-1-oxyl-3-oxide), an NO scavenger, resulted in a significant delay in nodule appearance. The overexpression of a bacterial hmp gene, encoding a flavohaemoglobin able to scavenge NO, under the control of a nodule-specific promoter (pENOD20) in transgenic roots, led to the same phenotype. The NO scavenging resulting from these approaches provoked the downregulation of plant genes involved in nodule development, such as MtCRE1 and MtCCS52A. Furthermore, an Hmp-overexpressing *S. meliloti* mutant strain was found to be less competitive than the wild type in the nodulation process. Taken together, these results indicate that NO is required for an optimal establishment of the *M. truncatula*-*S. meliloti* symbiotic interaction.

~10 Citings

Copyright © 2015 U.S. National Library of Medicine.

461. Heterologous expression of *Anabaena* sp. PCC7120 cyanophycin metabolism genes *cphA1* and *cphB1* in *Sinorhizobium* (*Ensifer*) *meliloti* 1021

By Abd-El-Karem Yasser; Elbers Tanja; Reichelt Rudolf; Steinbuchel Alexander

From Applied microbiology and biotechnology (2011), 89(4), 1177-92, Language: English, Database: MEDLINE

Sinorhizobium meliloti infects leguminous plants resulting in a nitrogen-fixing symbiosis. Free living cells accumulate poly(3-hydroxybutyrate) (PHB) as carbon and energy source under imbalanced growth conditions. The *cphA1* (7120) gene encoding a cyanophycin (CGP) synthetase of *Anabaena* sp. PCC7120 in plasmids pVLT31::*cphA1* (7120) and pBBR1MCS-3::*cphA1* (7120) was expressed in the wild-type *S. meliloti* 1021 and in a *phbC*-negative mutant generated in this study. Expression of *cphA1* (7120) and accumulation of CGP in cells were studied in various media. Yeast mannitol broth (YMB) and pBBR1MCS-3::*cphA1* (7120) yielded the highest CGP contents in both *S. meliloti* 1021 strains. Supplying the YMB medium with isopropyl- β -D-thiogalactopyranoside, aspartic acid, and arginine enhanced CGP contents about 2.5- and 2.8-fold in *S. meliloti* 1021 (pBBR1MCS-3::*cphA1* (7120)) and *S. meliloti* 1021 *phbC* Ω Km (pBBR1MCS-3::*cphA1* (7120)), respectively. Varying the nitrogen-to-carbon ratio in the medium enhanced the CGP content further to 43.8% (w/w) of cell dry weight (CDW) in recombinant cells of *S. meliloti* 1021 *phbC* Ω Km (pBBR1MCS-3::*cphA1* (7120)). Cells of *S. meliloti* 1021 (pBBR1MCS-3::*cphA1* (7120)) accumulated CGP up to 39.6% in addition to 12.1% PHB (w/w, of CDW). CGP from the *S. meliloti* strains consisted of equimolar amounts of aspartic acid and arginine and contained no other amino acids even if the medium was supplemented with glutamic acid, citrulline, ornithine, or lysine. CGP isolated from cells of *S. meliloti* 1021 (pBBR1MCS-3::*cphA1* (7120)) and *S. meliloti* 1021 *phbC* Ω Km (pBBR1MCS-3::*cphA1* (7120)) exhibited average molecular weights between 20 and 25 kDa, whereas CGP isolated from *Escherichia coli* S17-1 (pBBR1MCS-3::*cphA1* (7120)) exhibited average molecular weight between 22 and 30 kDa. Co-expression of cyanophycinase from *Anabaena* sp. PCC7120 encoded by *cphB1* (7120) in *cphA1* (7120)-positive *E. coli* S17-1, *S. meliloti* 1021, and its *phbC*-negative mutant gave cyanophycinase activities in crude extracts, and no CGP granules occurred. A higher PHB content in *S. meliloti* 1021 (pBBR1MCS-3::*cphB1* (7120)::*cphA1* (7120)) in comparison to the control indicated that the cells used CGP degradation product (β -aspartate-arginine dipeptide) to fuel PHB biosynthesis.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

462. The role of sigma factor RpoH1 in the pH stress response of *Sinorhizobium meliloti*

By de Lucena Daniella K C; Puhler Alfred; Weidner Stefan

From BMC microbiology (2010), 10265, Language: English, Database: MEDLINE

BACKGROUND: Environmental pH stress constitutes a limiting factor for *S. meliloti* survival and development. The response to acidic pH stress in *S. meliloti* is versatile and characterized by the differential expression of genes associated with various cellular functions. The purpose of this study was to gain detailed insight into the participation of sigma factors in the complex stress response system of *S. meliloti* 1021 using pH stress as an effector. **RESULTS:** In vitro assessment of *S. meliloti* wild type and sigma factor mutants provided first evidence that the sigma factor RpoH1 plays a major role in the pH stress response. Differential expression of genes related to rhizobactin biosynthesis was observed in microarray analyses performed with the *rpoH1* mutant at pH 7.0. The involvement of the sigma factor RpoH1 in the regulation of *S. meliloti* genes upon pH stress was analyzed by comparing time-course experiments of the wild type and the *rpoH1* mutant. Three classes of *S. meliloti* genes could be identified, which were transcriptionally regulated in an RpoH1-independent, an RpoH1-dependent or in a complex manner. The first class of *S. meliloti* genes, regulated in an RpoH1-independent manner, comprises the group of the exopolysaccharide I biosynthesis genes and also the group of genes involved in motility and flagellar biosynthesis. The second class of *S. meliloti* genes, regulated in an RpoH1-dependent manner, is composed of genes known from heat shock studies, like *ibpA*, *grpE* and *groEL5*, as well as genes involved in translation like *tufA* and *rpIC*. Finally, the third class of *S. meliloti* genes was regulated in a complex manner, which indicates that besides sigma factor RpoH1, further regulation takes place. This was found to be the case for the genes *dctA*, *ndvA* and *smc01505*. **CONCLUSIONS:** Clustering of time-course microarray data of *S. meliloti* wild type and sigma factor *rpoH1* mutant allowed for the identification of gene clusters, each with a unique time-dependent expression pattern, as well as for the classification of genes according to their dependence on RpoH1 expression and regulation. This study provided clear evidence that the sigma factor RpoH1 plays a major role in pH stress response.

~6 Citings

Copyright © 2015 U.S. National Library of Medicine.

463. EPS II-dependent autoaggregation of *Sinorhizobium meliloti* planktonic cells

By Sorroche Fernando G; Rinaudi Luciana V; Zorreguieta Angeles; Giordano Walter
From *Current microbiology* (2010), 61(5), 465-70, Language: English, Database: MEDLINE

Planktonic cells of *Sinorhizobium meliloti*, a Gram-negative symbiotic bacterium, display autoaggregation under static conditions. ExpR is a LuxR-type regulator that controls many functions in *S. meliloti*, including synthesis of two exopolysaccharides, EPS I (succinoglycan) and EPS II (galactoglucan). Since exopolysaccharides are important for bacterial attachment, we studied the involvement of EPS I and II in autoaggregation of *S. meliloti*. Presence of an intact copy of the expR locus was shown to be necessary for autoaggregation. A mutant incapable of producing EPS I displayed autoaggregation percentage similar to that of parental strain, whereas autoaggregation was significantly lower for a mutant defective in biosynthesis of EPS II. Our findings clearly indicate that EPS II is the essential component involved in autoaggregation of planktonic *S. meliloti* cells, and that EPS I plays no role in such aggregation.

~11 Citings

Copyright © 2015 U.S. National Library of Medicine.

464. Growth and Movement of Spot Inoculated *Rhizobium meliloti* on the Root Surface of Alfalfa

By Caetano-Anolles G; Wrobel-Boerner E; Bauer W D
From *Plant physiology* (1992), 98(3), 1181-9, Language: English, Database: MEDLINE

Inoculum droplets of approximately 10 nanoliter volume and containing about 10 *Rhizobium meliloti* cells were placed onto the root surface of alfalfa seedlings in plastic growth pouches at either the root tip, the position of the smallest emergent root hairs, or at a site midway between these points. The droplets were initially confined to an area of about 0.2 square millimeter at the point of application. By 48 and 96 hours after inoculation, the inoculum bacteria and their progeny were distributed over several centimeters of the root between the initial site of deposition and the growing root tip, reaching densities of 10(3) to 10(4) bacteria per centimeter near the site of initial deposition and decreasing exponentially from that point toward the root tip. Graphite particles deposited on the root surface close to the growing tip were similarly distributed along the root length by 48 and 96 hours, suggesting that passive displacement by root cell elongation was primarily responsible for the spread of bacteria. A nonmotile mutant of *R. meliloti* colonized alfalfa roots to the same extent as the wild type and was usually distributed in the same manner, indicating that bacterial motility contributed little under these conditions to long distance spread of the bacteria. However, when applied in low numbers, *R. meliloti* mutants defective in motility or chemotaxis were considerably less efficient in initiating nodules near the point of inoculation than the wild type. This implies that motility and/or chemotaxis contribute significantly to local exploration for suitable infection sites. Almost all nodules on the primary root formed within a few millimeters of the spot-inoculation site, indicating that, under our experimental conditions, movement and multiplication of *R. meliloti* on the root surface were not sufficient to maintain an adequate population in the infectible region of the root during root growth.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

465. Photonastic Control of Leaflet Orientation in *Melilotus indicus* (Fabaceae)

By Schwartz A; Gilboa S; Koller D
From *Plant physiology* (1987), 84(2), 318-23, Language: English, Database: MEDLINE

Leaflet orientation in *Melilotus indicus* (L.) All. is under photonastic control during the day and nyctinastic control during the night, but also exhibits a diaphototropic (solar-tracking) response. Detached leaves with the two lateral leaflets excised were used to study the solar-tracking capability of the terminal leaflet. Perception of the photonastic excitation is located in the pulvinule. The lower (abaxial) and upper (adaxial) surfaces perceive photonastic excitation, which results in concomitant contraction of the side exposed to light and/or expansion of the opposite side. Steady state lamina elevation is determined by the fluence rates of the light incident simultaneously on the opposite sides. Light sensitivity of the lower side exceeds that of the upper. Response to photonastic excitation of either side is affected by angle of incidence of the light, but angular dependence is restricted to a limited range of angle of incidence, which differs for the two sides. This may be accounted for by the different topography of the two pulvinar surfaces and the localization in them of the light-sensitive tissues.

~1 Citing

Copyright © 2015 U.S. National Library of Medicine.

466. Host-specific regulation of nodulation genes in *Rhizobium* is mediated by a plant-signal, interacting with the nodD gene product

By Horvath B; Bachem C W; Schell J; Kondorosi A

From The EMBO journal (1987), 6(4), 841-8, Language: English, Database: MEDLINE

We have identified a *nodD* gene from the wide host-range *Rhizobium* strain MPIK3030 (termed *nodD1*) which is essential for nodulation on *Macroptilium atropurpureum* (*siratro*). Experiments with *nodA-lacZ* gene fusions demonstrate that the MPIK3030 *nodD1* regulates expression of the *nodABC* genes. Additionally, we used *nodC-lacZ* fusions of *Rhizobium meliloti* to show that the MPIK3030 *nodD1* gene induces expression of these fusions by interacting with plant factors from *siratro* and from the non-host *Medicago sativa* (*alfalfa*). The *R. meliloti nodD* genes, however, only interact with *alfalfa* exudate. In line with these results, no complementation of MPIK3030 *nodD1* mutants could be obtained on *siratro* with the *R. meliloti nodD* genes, while the MPIK3030 *nodD1* can complement *nodD* mutants of *R. meliloti* on *alfalfa*. Furthermore, *R. meliloti* transconjugants harbouring the MPIK3030 *nodD1* efficiently nodulate the illegitimate host *siratro*. When compared with other *nodD* sequences, the amino acid sequence of the MPIK3030 *nodD1* shows a conserved aminoterminal, whereas the carboxy-terminus of the putative gene product diverges considerably. Studies on a chimeric MPIK3030/*R. meliloti nodD* gene indicates that the carboxy-terminal region is responsible for the interaction with plant factor(s) and may have evolved in different rhizobia specifically to interact with plant-host factors.

~13 Citings

Copyright © 2015 U.S. National Library of Medicine.

467. Attenuation of Symbiotic Effectiveness by *Rhizobium meliloti* SAF22 Related to the Presence of a Cryptic Plasmid

By Velazquez E; Mateos P F; Pedrero P; Dazzo F B; Martinez-Molina E

From Applied and environmental microbiology (1995), 61(5), 2033-6, Language: English, Database: MEDLINE

Several wild-type strains of *Rhizobium meliloti* isolated from *alfalfa* nodules exhibited different plasmid profiles, yet did not differ in growth rate in yeast-mannitol medium, utilization of 43 different carbon sources, intrinsic resistance to 14 antibiotics, or detection of 16 enzyme activities. In contrast, three measures of effectiveness in symbiotic nitrogen fixation with *alfalfa* (shoot length, dry weight, and nitrogen content) indicated that *R. meliloti* SAF22, whose plasmid profile differs from those of the other strains tested, is significantly less effective than other wild-type strains in symbiotic nitrogen fixation. Light microscopy of nodules infected with strain SAF22 showed an abnormal center of nitrogen fixation zone III, with bacteria occupying a smaller portion of the infected host cells and vacuoles occupying a significantly larger portion of adjacent uninfected host cells. In contrast, the effective nodules infected with other wild types or plasmid pRmSAF22c-cured segregants of SAF22 did not display this cytological abnormality.

~1 Citing

Copyright © 2015 U.S. National Library of Medicine.

468. Chemotaxis of *Rhizobium meliloti* towards Nodulation Gene-Inducing Compounds from *Alfalfa* Roots

By Dharmatilake A J; Bauer W D

From Applied and environmental microbiology (1992), 58(4), 1153-8, Language: English, Database: MEDLINE

Luteolin, a flavone present in seed exudates of *alfalfa*, induces nodulation genes (*nod*) in *Rhizobium meliloti* and also serves as a biochemically specific chemoattractant for the bacterium. The present work shows that *R. meliloti* RCR2011 is capable of very similar chemotactic responses towards 4',7-dihydroxyflavone, 4',7-Dihydroxyflavanone, and 4,4'-dihydroxy-2-methoxychalcone, the three principal *nod* gene inducers secreted by *alfalfa* roots. Chemotactic responses to the root-secreted *nod* inducers in capillary assays were usually two- to four-fold above background and, for the flavone and flavonone, occurred at concentrations lower than those required for half-maximal induction of the *nodABC* genes. Complementation experiments indicated that the lack of chemotactic responsiveness to luteolin seen in *nodD1* and *nodA* mutants of *R. meliloti* was not due to mutations in the *nod* genes, as previously thought. Thus, while *nod* gene induction and flavonoid chemotaxis have the same biochemical specificity, these two functions appear to have independent receptors or transduction pathways. The wild-type strain was found to suffer selective, spontaneous loss of chemotaxis towards flavonoids during laboratory subculture.

~1 Citing

Copyright © 2015 U.S. National Library of Medicine.

469. Host Restriction and Transduction in *Rhizobium meliloti*

By Williams M N; Klein S; Signer E R

From Applied and environmental microbiology (1989), 55(12), 3229-30, Language: English, Database: MEDLINE

A host restriction difference exists between *Rhizobium meliloti* Rm41 and SU47 exists as indicated by the reduce plating efficiency of transducing phage PhiM12h1. Restriction can be attenuated by incubating cells at 42 degrees C for 3 h; this procedure overcomes a block to transduction from SU47 to Rm41.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

470. Host-Symbiont Specificity Expressed during Early Adsorption of *Rhizobium meliloti* to the Root Surface of Alfalfa

By Anolles G C; Favelukes G

From Applied and environmental microbiology (1986), 52(2), 377-82, Language: English, Database: MEDLINE

Early (4 h) adsorption of *Rhizobium meliloti* L5-30 in low numbers to alfalfa roots in mineral solution was examined for competition with other bacterial strains. All tested competitor strains decreased the adsorption of L5-30 by extents which depended on the strain and its concentration. The decrease of adsorption by *R. meliloti* competitors (all of them infective in alfalfa) was nearly complete at saturation (97 to 99% decrease). All other heterologous rhizobia and *Agrobacterium tumefaciens* at saturating concentrations (10 to 10 per ml) decreased adsorption of L5-30 only partially, less than 60%. The differential effects of homologous and heterologous competitors indicate that initial adsorption of *R. meliloti* to the root surface of its host occurs in symbiont-specific as well as nonspecific modes and suggest the existence of binding sites on roots which are highly selective for the specific microsymbiont in the presence of other heterologous bacteria even in very unfavorable (less than 10) symbiont-competitor concentration ratios.

~4 Citings

Copyright © 2015 U.S. National Library of Medicine.

471. Conserved Nodulation Genes in *Rhizobium meliloti* and *Rhizobium trifolii*

By Fisher R F; Tu J K; Long S R

From Applied and environmental microbiology (1985), 49(6), 1432-5, Language: English, Database: MEDLINE

Plasmids which contained wild-type or mutated *Rhizobium meliloti* nodulation (nod) genes were introduced into NodR. *trifolii* mutants ANU453 and ANU851 and tested for their ability to nodulate clover. Cloned wild-type and mutated *R. meliloti* nod gene segments restored ANU851 to Nod, with the exception of nodD mutants. Similarly, wild-type and mutant *R. meliloti* nod genes complemented ANU453 to Nod, except for nodCII mutants. Thus, ANU851 identifies the equivalent of the *R. meliloti* nodD genes, and ANU453 specifies the equivalent of the *R. meliloti* nodCII genes. In addition, cloned wild-type *R. trifolii* nod genes were introduced into seven *R. meliloti* Nod mutants. All seven mutants were restored to Nod on alfalfa. Our results indicate that these genes represent common nodulation functions and argue for an allelic relationship between nod genes in *R. meliloti* and *R. trifolii*.

~7 Citings

Copyright © 2015 U.S. National Library of Medicine.

472. Variation in Preference for *Rhizobium meliloti* Within and Between *Medicago sativa* Cultivars Grown in Soil

By Bromfield E S

From Applied and environmental microbiology (1984), 48(6), 1231-6, Language: English, Database: MEDLINE

Variation in nodulation preferences for *Rhizobium* strains within and between *Medicago sativa* cultivars was assessed in the greenhouse with plants grown in Leonard jars and two soils of diverse origin (Lanark and Ottawa), using inocula consisting of effective individual or paired strains of *R. meliloti* which could be recognized by high-concentration antibiotic resistance. The results indicated considerable variability in host preferences for *R. meliloti* among plants within cultivars but not between cultivars. The implications of this variation are discussed from the point of view of possible improvement of symbiotic nitrogen fixation. With one exception, the differences in nodulation success between inoculant *R. meliloti* strains were consistent in Leonard jars and both soils. All introduced strains formed significantly more nodules in Renfrew soil containing few native rhizobia than in Ottawa soil with a large resident *R. meliloti* population. Plants grown in Lanark soil without inoculation were ineffectively nodulated by native rhizobia and yielded significantly less growth than those receiving inoculation. In contrast, the yield of inoculated plants in Ottawa soil did not significantly differ from those without inoculation due to effective nodulation by native *R. meliloti*. The data indicated synergistic effects on yield by certain paired strain inocula relative to the same strains inoculated individually in Lanark but not in Ottawa soil or Leonard jars.

~2 Citings

Copyright © 2015 U.S. National Library of Medicine.

473. Complementary Methods for the Differentiation of Rhizobium *meliloti* Isolates

By Fuquay J I; Bottomley P J; Jenkins M B

From Applied and environmental microbiology (1984), 47(4), 663-9, Language: English, Database: MEDLINE

Because of the scarcity of literature on the successful use of serological methods for differentiation of Rhizobium *meliloti* isolates, the objectives of this study were to provide a rationale for selecting isolates to which antisera could be raised and to appraise the suitability of published methods of preparing R. *meliloti* antigens for the serological identification of field isolates. We used one-dimensional sodium dodecyl sulfate-polyacrylamide gel electrophoresis to develop protein profiles of eight field isolates and one commercial inoculant strain of R. *meliloti* in order to choose candidates that were either identical or distinctly different from each other for the production of antisera. The serological methods of tube agglutination and gel immunodiffusion complemented the sodium dodecyl sulfate-polyacrylamide gel electrophoresis method of identification. On the basis of their agglutination titers and gel immunodiffusion analysis, the isolates were placed in five serogroups which were identical to the groupings based on protein profiles. Antigenic characteristics of gel immunodiffusion antigens were influenced by the composition of the growth medium, sonication of whole-cell antigens, and the addition of Formalin. We recommend that careful attention be given to the effects of varying antigen preparation procedures when analyzing R. *meliloti* so that experimental protocols do not complicate the results. The wide range of homologous-antiserum titers observed for the nine isolates indicates different inherent degrees of immunogenicity of R. *meliloti* which cannot be predicted before serum production. The sodium dodecyl sulfate-polyacrylamide gel electrophoresis method is a useful tool for screening a collection of R. *meliloti* isolates to better ensure that strain-specific antisera representative of different types of organisms will be obtained.

~3 Citings

Copyright © 2015 U.S. National Library of Medicine.

474. The response to nitric oxide of the nitrogen-fixing symbiont Sinorhizobium *meliloti*

By Meilhoc Eliane; Cam Yvan; Skapski Agnes; Bruand Claude

From Molecular plant-microbe interactions : MPMI (2010), 23(6), 748-59, Language: English, Database: MEDLINE

Nitric oxide (NO) is crucial in animal- and plant-pathogen interactions, during which it participates in host defense response and resistance. Indications for the presence of NO during the symbiotic interaction between the model legume *Medicago truncatula* and its symbiont *Sinorhizobium meliloti* have been reported but the role of NO in symbiosis is far from being elucidated. Our objective was to understand the role or roles played by NO in symbiosis. As a first step toward this goal, we analyzed the bacterial response to NO in culture, using a transcriptomic approach. We identified approximately 100 bacterial genes whose expression is upregulated in the presence of NO. Surprisingly, most of these genes are regulated by the two-component system FixLJ, known to control the majority of rhizobial genes expressed in planta in mature nodules, or the NO-dedicated regulator NnrR. Among the genes responding to NO is *hmp*, encoding a putative flavohemoglobin. We report that an *hmp* mutant displays a higher sensitivity toward NO in culture and leads to a reduced nitrogen fixation efficiency in planta. Because flavohemoglobins are known to detoxify NO in numerous bacterial species, this result is the first indication of the importance of the bacterial NO response in symbiosis.

~13 Citings

Copyright © 2015 U.S. National Library of Medicine.

475. Factors influencing the production of stilbenes by the knotweed, *Reynoutria x bohemica*

By Kovarova Marcela; Bartunkova Kristyna; Frantik Tomas; Koblihova Helena; Prchalova Katerina; Vosatka Miroslav

From BMC plant biology (2010), 1019, Language: English, Database: MEDLINE

BACKGROUND: Japanese knotweed, *Reynoutria japonica*, is known for its high growth rate, even on adverse substrates, and for containing organic substances that are beneficial to human health. Its hybrid, *Reynoutria x bohemica*, was described in the Czech Republic in 1983 and has been widespread ever since. We examined whether *Reynoutria x bohemica* as a medicinal plant providing stilbenes and emodin, can be cultivated in spoil bank substrates and hence in the coalmine spoil banks changed into arable fields. We designed a pot experiment and a field experiment to assess the effects of various factors on the growth efficiency of *Reynoutria x bohemica* on clayish substrates and on the production of stilbenes and emodin in this plant. **RESULTS:** In the pot experiment, plants were grown on different substrates that varied in organic matter and nutrient content, namely the content of nitrogen and phosphorus. Nitrogen was also introduced into the substrates by *melilot*, a leguminous plant with nitrogen-fixing rhizobia. *Melilot* served as a donor of mycorrhizal fungi to knotweed, which did not form any mycorrhiza when grown alone. As expected, the production of knotweed biomass was highest on high-nutrient substrates, namely compost. However, the concentration of the organic constituents studied was higher in plants grown on clayish low-nutrient substrates in the presence of *melilot*. The content of resveratrol including that of its derivatives, resveratrolisid, piceatannol, piceid and astringin, was significantly higher in the presence of *melilot* on clay, loess and clayCS. Nitrogen supplied to knotweed by *melilot* was correlated with the ratio of resveratrol to resveratrol glucosides, **indicating** that knotweed bestowed some of its glucose production upon covering part of the energy demanded for nitrogen fixation by *melilot*'s rhizobia, and that there is an exchange of organic substances between these two plant species. The three-year field experiment confirmed the ability of *Reynoutria x bohemica* to grow on vast coalmine spoil banks. The production of this species reached 2.6 t of dry mass per hectare. **CONCLUSIONS:** Relationships between nitrogen, phosphorus, emodin, and belowground knotweed biomass belong to the most interesting results of this study. Compared with *melilot* absence, its presence increased the number of significant relationships by introducing those of resveratrol and its derivatives, and phosphorus and nitrogen. Knotweed phosphorus was predominantly taken up from the substrate and was negatively correlated with the content of resveratrol and resveratrol derivatives, while knotweed nitrogen was mainly supplied by *melilot* rhizobia and was positively correlated with the content of resveratrol and resveratrol derivatives.

~1 Citing

Copyright © 2015 U.S. National Library of Medicine.

[476. Effect of poly-3-hydroxybutyrate synthase mutation on the metabolism of *Ensifer* \(formerly *Sinorhizobium*\) *meliloti*](#)

By Povolo Silvana; Casella Sergio

From *Journal of basic microbiology* (2009), 49(2), 178-86, Language: English, Database: MEDLINE

In order to investigate the effect of poly-3-hydroxybutyrate synthase mutation (phbC) on the synthesis of exopolysaccharides (EPS) and glycogen, on the symbiotic properties and on the survival under specific conditions of *Ensifer meliloti* (formerly *Sinorhizobium*), a new stable phbC mutant of *Ensifer meliloti* 41 was isolated and characterized. Under poly-3-hydroxybutyrate accumulation conditions, the phbC -minus mutant (strain 41003) accumulates more glycogen and less exopolysaccharides as compared to the wild-type strain, and grows poorly in pyruvate as carbon source. The inactivation of *aniA*, encoding for a global carbon flux regulator, restores in *E. meliloti* 41003 the ability to grow on pyruvate, **indicating** a new role for this gene. Survival studies of *E. meliloti* 41 and 41003 under carbon free medium in both liquid and soil microcosms showed prolonged survival of *E. meliloti* 41 under these adverse conditions as compared to the mutant strain unable to accumulate the polyester. On the other hand, the accumulation of P(3HB) gave no significant advantage in survival under oxygen-limiting conditions. In both strains, *E. meliloti* 41 and 41003, nodule-inducing ability on alfalfa plants and acetylene reduction activity did not significantly differ from each other, although the mutant strain was less competitive in terms of root colonization.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

[477. Mechanism of infection thread elongation in root hairs of *Medicago truncatula* and dynamic interplay with associated rhizobial colonization](#)

By Fournier Joelle; Timmers Antonius C J; Sieberer Bjorn J; Jauneau Alain; Chabaud Mireille; Barker David G

From *Plant physiology* (2008), 148(4), 1985-95, Language: English, Database: MEDLINE

In temperate legumes, endosymbiotic nitrogen-fixing rhizobia gain access to inner root tissues via a specialized transcellular apoplastic compartment known as the infection thread (IT). To study IT development in living root hairs, a protocol has been established for *Medicago truncatula* that allows confocal microscopic observations of the intracellular dynamics associated with IT growth. Fluorescent labeling of both the IT envelope (AtPIP2;1-green fluorescent protein) and the host endoplasmic reticulum (green fluorescent protein-HDEL) has revealed that IT growth is a fundamentally discontinuous process and that the variable rate of root hair invagination is reflected in changes in the host cell cytoarchitecture. The concomitant use of fluorescently labeled *Sinorhizobium meliloti* has further revealed that a bacteria-free zone is frequently present at the growing tip of the IT, thus **indicating** that bacterial contact is not essential for thread progression. Finally, these *in vivo* studies have shown that **gaps** within the bacterial file are a common feature during the early stages of IT development, and that segments of the file are able to slide collectively down the thread. Taken together, these observations lead us to propose that (1) IT growth involves a host-driven cellular mechanism analogous to that described for intracellular infection by arbuscular mycorrhizal fungi; (2) the non-regular growth of the thread is a consequence of the rate-limiting colonization by the infecting rhizobia; and (3) bacterial colonization involves a combination of bacterial cell division and sliding movement within the extracellular matrix of the apoplastic compartment.

~16 Citings

Copyright © 2015 U.S. National Library of Medicine.

478. Characterization of root nodule and rhizobium of a Leguminosae ephemeral plant--*Trigonella arcuata* C. A. Mey in Xinjiang

By You Tianyu; Tan Zhi; Gu Lili; Li Xiuming; Yao Shixiang; Lan Haiyan; Zhang Fuchun

From *Wei sheng wu xue bao = Acta microbiologica Sinica* (2008), 48(7), 917-23, Language: Chinese, Database: MEDLINE

OBJECTIVE: We studied root nodule proliferation, nodule microstructure, genetic cluster and stress resistance of the rhizobium of *Trigonella arcuata*. **METHODS:** We characterized root nodule and rhizobium with various soil matrixes cultivation, paraffin section, resin semi-ultrathin section techniques, and 16S rRNA gene cluster analysis. **RESULTS:** (1) Plants grew in mixed soil (nutritious garden soil: poplar zone soil: desert sands = 1:1:1), had the most nodule proliferation and bore the most pods. The shapes of nodule were palm- or ginger-like; (2) Microstructure of the nodule revealed five different parts differentiated within the nodule: epidermis (E), cortex (C), vascular bundle (VB), infected cells (IC) and uninfected cells (UIC); (3) Genetic cluster analysis of the full length 16S rRNA gene sequence (1377 bp) **indicated** that the rhizobium isolated shared the highest identities with *Sinorhizobium meliloti*; (4) The rhizobium could grow between 4 and 60 degrees C (20 min), pH 6.0-12.0 and 0-2% NaCl. For the antibiotic sensitivity, the rhizobium could not grow normally in medium with 25 microg/mL Kanamycin, Streptomycin or Cephalothin, except for 100 microg/mL Ampicillin. **CONCLUSION:** Good conditions of soil matrixes were important for nodulation of *T. arcuata*; A large quantity of cells in fascicular nodules were infected by rhizobia; 16S rRNA gene sequence of *T. arcuata* shared the highest identities with that of *Sinorhizobium meliloti*, and this strain was able to tolerate relatively higher temperature and alkaline.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

479. Conjugal properties of the *Sinorhizobium meliloti* plasmid mobilome

By Pistorio Mariano; Giusti Maria A; Del Papa Maria F; Draghi Walter O; Lozano Mauricio J; Tejerizo Gonzalo Torres; Lagares Antonio

From *FEMS microbiology ecology* (2008), 65(3), 372-82, Language: English, Database: MEDLINE

The biology and biochemistry of plasmid transfer in soil bacteria is currently under active investigation because of its central role in prokaryote adaptation and evolution. In this work, we examined the conjugal properties of the cryptic plasmids present in a collection of the N(2)-fixing legume-symbiont *Sinorhizobium meliloti*. The study was performed on 65 *S. meliloti* isolates recovered from 25 humic soils of Argentina, which were grouped into 22 plasmid-profile types [i.e. plasmid operational taxonomic units (OTUs)]. The cumulative Shannon index calculated for the observed plasmid profiles showed a clear saturation plateau, thus **indicating** an adequate representation of the *S. meliloti* plasmid-profile types in the isolates studied. The results show that isolates of nearly 14% of the plasmid OTUs hosted transmissible plasmids and that isolates of 29% of the plasmid OTUs were able to retransfer the previously characterized mobilizable-cryptic plasmid pSmeLPU88b to a third recipient strain. It is noteworthy that isolates belonging to 14% of the plasmid OTUs proved to be refractory to the entrance of the model plasmid pSmeLPU88b, suggesting either the presence of surface exclusion phenomena or the occurrence of restriction incompatibility with the incoming replicon. Incompatibility for replication between resident plasmids and plasmid pSmeLPU88b was observed in c. 20% of the OTUs. The results reported here reveal a widespread compatibility among the conjugal functions of the cryptic plasmids in *S. meliloti*, and this fact, together with the observed high proportion of existing donor genotypes, points to the extrachromosomal compartment of the species as being an extremely active plasmid mobilome.

~1 Citing

Copyright © 2015 U.S. National Library of Medicine.

480. Genome sequence of the beta-rhizobium *Cupriavidus taiwanensis* and comparative genomics of rhizobia

By Amadou Claire; Pascal Geraldine; Mangenot Sophie; Glew Michelle; Bontemps Cyril; Capela Delphine; Carrere Sebastien; Cruveiller Stephane; Dossat Carole; Lajus Aurelie; et al

From Genome research (2008), 18(9), 1472-83, Language: English, Database: MEDLINE

We report the first complete genome sequence of a beta-proteobacterial nitrogen-fixing symbiont of legumes, *Cupriavidus taiwanensis* LMG19424. The genome consists of two chromosomes of size 3.42 Mb and 2.50 Mb, and a large symbiotic plasmid of 0.56 Mb. The *C. taiwanensis* genome displays an unexpected high similarity with the genome of the saprophytic bacterium *C. eutrophus* H16, despite being 0.94 Mb smaller. Both organisms harbor two chromosomes with large regions of synteny interspersed by specific regions. In contrast, the two species host highly divergent plasmids, with the consequence that *C. taiwanensis* is symbiotically proficient and less metabolically versatile. Altogether, specific regions in *C. taiwanensis* compared with *C. eutrophus* cover 1.02 Mb and are enriched in genes associated with symbiosis or virulence in other bacteria. *C. taiwanensis* reveals characteristics of a minimal rhizobium, including the most compact (35-kb) symbiotic island (*nod* and *nif*) identified so far in any rhizobium. The atypical phylogenetic position of *C. taiwanensis* allowed insightful comparative genomics of all available rhizobium genomes. We did not find any gene that was both common and specific to all rhizobia, thus suggesting that a unique shared genetic strategy does not support symbiosis of rhizobia with legumes. Instead, phylodistribution analysis of more than 200 *Sinorhizobium meliloti* known symbiotic genes indicated large and complex variations of their occurrence in rhizobia and non-rhizobia. This led us to devise an in silico method to extract genes preferentially associated with rhizobia. We discuss how the novel genes we have identified may contribute to symbiotic adaptation.

~21 Citings

Copyright © 2015 U.S. National Library of Medicine.

481. The periplasmic regulator ExoR inhibits ExoS/ChvI two-component signalling in *Sinorhizobium meliloti*

By Chen Esther J; Sabio Erich A; Long Sharon R

From Molecular microbiology (2008), 69(5), 1290-303, Language: English, Database: MEDLINE

Sinorhizobium meliloti requires ExoS/ChvI two-component signalling to establish a nitrogen-fixing symbiosis with legume hosts. The importance of ExoS/ChvI signalling in microbe-host interactions is underscored by the requirement of ExoS/ChvI orthologues for virulence of the related alpha-proteobacteria *Agrobacterium tumefaciens* and *Brucella abortus*. In *S. meliloti*, ExoS/ChvI is a key regulator of gene expression for exopolysaccharide synthesis, biofilm formation, motility, nutrient utilization and free-living viability. Previously, we showed that the novel conserved regulator ExoR interacts genetically with both ExoS and ChvI, and localizes to the periplasm of *S. meliloti*. Here, we show that ExoR physically associates with ExoS and that this association is important for regulating ExoS/ChvI signalling. We have identified point mutations in the Sel1-like repeat region of ExoR that disrupt binding to ExoS and cause a dramatic increase in ExoS/ChvI-dependent gene expression. Furthermore, we have found that physical interaction with ExoS stabilizes the ExoR protein. Together, our results indicate that ExoR binds to ExoS in the periplasm of *S. meliloti* to inhibit ExoS/ChvI activity, and that ExoR represents a novel periplasmic inhibitor of two-component signalling.

~19 Citings

Copyright © 2015 U.S. National Library of Medicine.

482. Effect of salt stress on the expression of NHX-type ion transporters in *Medicago intertexta* and *Melilotus indicus* plants

By Zahran Hamdi H; Marin-Manzano M Carmen; Sanchez-Raya A Juan; Bedmar Eulogio J; Venema Kees; Rodriguez-Rosales M Pilar

From Physiologia plantarum (2007), 131(1), 122-30, Language: English, Database: MEDLINE

Medicago intertexta and *Melilotus indicus*, two wild leguminous herbs with different tolerance to salinity were investigated for NaCl-induced changes in the expression level of some Na(+) transporters. *M. indicus* plants grew well at NaCl concentration from 0 to 400 mM, whereas growth of *M. intertexta* plants was severely inhibited at NaCl concentrations higher than 100 mM. In *M. intertexta*, increasing NaCl in the growth media caused a strong increase in Na(+) content concomitant with a decrease in K(+) content in leaves and, above all, roots. In comparison, *M. indicus* plants cultivated in the presence of NaCl accumulated much less Na(+) in leaves and roots and no differences in K(+) content among plants grown in nutrient solution containing 100-400 mM NaCl were detected. The expression levels of four genes coding for NHX-type Na(+)/H(+) antiporters in the above two wild legumes were studied in plants cultivated under the different NaCl concentrations. Expression levels of the genes were higher in *M. intertexta* as compared with *M. indicus* plants. In *M. intertexta*, salt treatments increased MtNHX1, MtNHX3 and MtNHX4 transcript levels in leaves and roots. However, in *M. indicus* NaCl treatments only induced the expression of MtNHX1 in roots. Our data suggest that two different mechanisms, Na(+) avoidance or accumulation into cellular compartments, are developed by the two wild legumes to cope with salt stress, and that expression of NHX antiporters is linked to the accumulator phenotype.

~1 Citings

Copyright © 2015 U.S. National Library of Medicine.

483. Disruption of nifA gene influences multiple cellular processes in Sinorhizobium meliloti

By Gong Ziying; Zhu Jiabi; Yu Guanqiao; Zou Huasong

From Journal of genetics and genomics = Yi chuan xue bao (2007), 34(9), 783-9, Language: English, Database: MEDLINE

Sinorhizobium meliloti nifA is important in fixing nitrogen during symbiosis. A nifA null mutant induces small white invalid nodules in the roots of host plant. The additional phenotypic alterations associated with the disruption of the nifA gene are reported in this study. Under a free-living state, *S. meliloti* nifA mutant reduces its ability to swarm on a half-solid plate. Interestingly, the AHL (Acylhomoserine lactones) contents in the nifA mutant are lower than that of the wild type during the lag phase, whereas it is reversed in the logarithmic and stationary phases. Quantitative spectrophotometric assays reveal that the total amount of extracellular proteins of the nifA mutant are lower than that of the wild type. In addition, the mutant abolishes its nodulation competitive ability during symbiosis. These findings indicate that NifA plays a regulatory role in multiple cellular processes in *S. meliloti*.

~2 Citings

Copyright © 2015 U.S. National Library of Medicine.

484. Effects of Ca²⁺ on acid tolerance of Medicago sativa and Rhizobium meliloti

By Zhang Qin; Zhang Lei; Wei Shi-qing; Li Yan-bin; Zhang Chao

From Ying yong sheng tai xue bao = The journal of applied ecology / Zhongguo sheng tai xue xue hui, Zhongguo ke xue yuan Shenyang ying yong sheng tai yan jiu suo zhu ban (2007), 18(6), 1231-6, Language: Chinese, Database: MEDLINE

Soil acidity is an important environmental factor hampering the effective symbiotic nitrogen fixation of *Rhizobium meliloti* and its host plant *Medicago sativa*. The study on the effects of Ca²⁺ on the acid tolerance of *M. sativa* and *R. meliloti* showed that applying 5 and 10 mmol . L(-1) of Ca²⁺ could promote the growth of *R. meliloti* and advance its log growth phase. Under neutral pH condition, applying Ca²⁺ didn't have any significant effects on root hair deformation, while under low pH condition, Ca²⁺ demonstrated positive functions. The higher the Ca²⁺ concentration, the more significantly it affected, indicating that Ca²⁺ might play an important role in the recognition between *R. meliloti* and its host plant. Applying Ca²⁺ under low pH made the nodulation ahead of time and the nodulation rate enhanced. Definite concentration of Ca²⁺ could increase the number of nodules in the same period, which was more obvious at anaphase stage or under lower pH condition.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

485. Phytochemical investigation of Melilotus siculus and M. indica

By Rizk A M; Hammouda F M; Seif El-Nasr M M; Saleh N A; Abou-Yossef A A; Ghaleb H A; Madkour M K; El-Baroudy N H; Naggar A R; Pholand A E; et al

From Planta medica (1982), 45(3), 140-1, Language: English, Database: MEDLINE

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

486. Site-directed mutagenesis indicates an important role of cysteines 76 and 181 in the catalysis of hydantoin racemase from *Sinorhizobium meliloti*

By Martinez-Rodriguez Sergio; Andujar-Sanchez Montserrat; Neira Jose L; Clemente-Jimenez Josefa M; Jara-Perez Vicente; Rodriguez-Vico Felipe; Las Heras-Vazquez Francisco J
From Protein science : a publication of the Protein Society (2006), 15(12), 2729-38, Language: English, Database: MEDLINE

Hydantoin racemase enzyme plays a crucial role in the reaction cascade known as "hydantoinase process." In conjunction with a stereoselective hydantoinase and a stereospecific carbamoylase, it allows the total conversion from D,L-5-monosubstituted hydantoin, with a low rate of racemization, to optically pure D- or L-amino acids. Residues Cys76 and Cys181 belonging to hydantoin racemase from *Sinorhizobium meliloti* (SmeHyuA) have been proved to be involved in catalysis. Here, we report biophysical data of SmeHyuA Cys76 and Cys181 to alanine mutants, which point toward a two-base mechanism for the racemization of 5-monosubstituted hydantoin. The secondary and the tertiary structure of the mutants were not significantly affected, as shown by circular dichroism. Calorimetric and fluorescence experiments have shown that Cys76 is responsible for recognition and proton retrieval of D-isomers, while Cys181 is responsible for L-isomer recognition and racemization. This recognition process is further supported by measurements of protein stability followed by chemical denaturation in the presence of the corresponding compound.

~3 Citings

Copyright © 2015 U.S. National Library of Medicine.

487. Desiccation responses and survival of *Sinorhizobium meliloti* USDA 1021 in relation to growth phase, temperature, chloride and sulfate availability

By Vriezen J A C; de Bruijn F J; Nusslein K
From Letters in applied microbiology (2006), 42(2), 172-8, Language: English, Database: MEDLINE

AIMS: To identify physical and physiological conditions that affect the survival of *Sinorhizobium meliloti* USDA 1021 during desiccation. METHODS AND RESULTS: An assay was developed to study desiccation response of *S. meliloti* USDA 1021 over a range of environmental conditions. We determined the survival during desiccation in relation to (i) matrices and media, (ii) growth phase, (iii) temperature, and (iv) chloride and sulfate availability. CONCLUSIONS: This study indicates that survival of *S. meliloti* USDA 1021 during desiccation is enhanced: (i) when cells were dried in the stationary phase, (ii) with increasing drying temperature at an optimum of 37 degrees C, and (iii) during an increase of chloride and sulfate, but not sodium or potassium availability. In addition, we resolved that the best matrix to test survival was nitrocellulose filters. SIGNIFICANCE AND IMPACT OF THE STUDY: The identification of physical and physiological factors that determine the survival during desiccation of *S. meliloti* USDA 1021 may aid in (i) the strategic development of improved seed inocula, (ii) the isolation, and (iii) the development of rhizobial strains with improved ability to survive desiccation. Furthermore, this work may provide insights into the survival of rhizobia under drought conditions.

~7 Citings

Copyright © 2015 U.S. National Library of Medicine.

488. Phosphate limitation induces catalase expression in *Sinorhizobium meliloti*, *Pseudomonas aeruginosa* and *Agrobacterium tumefaciens*

By Yuan Ze-Chun; Zaheer Rahat; Finan Turlough M
From Molecular microbiology (2005), 58(3), 877-94, Language: English, Database: MEDLINE

Growth of *Sinorhizobium meliloti* under Pi-limiting conditions induced expression of the major H₂O₂-inducible catalase (HPII) gene (*katA*) in this organism. This transcription required the PhoB transcriptional regulator and initiated from a promoter that was distinct from the OxyR-dependent promoter which activates *katA* transcription in response to addition of H₂O₂. In N₂-fixing root nodules, *katA* was transcribed from the OxyR- and not the PhoB-dependent promoter. This is consistent with the accumulation of reactive oxygen species (ROS) in nodules and also indicates that bacteroids within nodules are not Pi-limited. Pi-limited growth also induced expression of catalase genes in *Agrobacterium tumefaciens* (HPI) and *Pseudomonas aeruginosa* (PA4236-HPI) suggesting that this may be a widespread phenomenon. The response is not a general stress response as in both *S. meliloti* and *P. aeruginosa* increased transcription is mediated by the phosphate responsive transcriptional activator PhoB. The phenotypic consequences of this response were demonstrated in *S. meliloti* by the dramatic increase in H₂O₂ resistance of wild type but not *phoB* mutant cells upon growth in Pi-limiting media. Our data indicate that in *S. meliloti*, *katA* and other genes whose products are involved in protection from oxidative stress are induced upon Pi-limitation. These observations suggest that as part of the response to Pi-limitation, *S. meliloti*, *P. aeruginosa* and *A. tumefaciens* have evolved a capacity to increase their resistance to oxidative stress. Whether this capacity evolved because Pi-starved cells generate more ROS or whether the physiological changes that occur in the cells in response to Pi-starvation render them more sensitive to ROS remains to be established.

~10 Citings

Copyright © 2015 U.S. National Library of Medicine.

489. A new bioactive flavone glycoside from the seeds of *Melilotus indica* All

By Yadava R N; Jain S

From Journal of Asian natural products research (2005), 7(4), 595-9, Language: English, Database: MEDLINE

Melilotus indica All. [Chopra, R.N., Nayar, S.L. and Chopra, I.C. (1956) Glossary Indian Med. Plants, 164 C.S.I.R. Publication New-Delhi; Kirtikar, K.R. and Basu, B.D. (1935) Indian Medicinal Plants, 2nd Ed., Vol. I, pp. 703-704 Lalit Mohan Basuan Co. Allahabad. The Wealth of India (1962) A Dictionary of Raw Materials and Industrial Products, Vol. VI, pp. 329-331 (C.S.I.R. Publication: New-Delhi)] belongs to family Leguminosae, which is commonly known as 'Banmethi' in Hindi. It is found in North India, extending into S. Persia, S. Europe and the Tropical zone of India. The seeds are used as an anthelmintic, an antipyretic, for curing heart diseases, bronchitis, leprosy, bowel complaints and infantile diarrhea. The plant has also been used as a discutient, emollient, and as a fomentation. It is also useful in a plaster for swelling. It is considered astringent and narcotic. Earlier workers have reported the presence of C-glycosides [Sayed, E.L., Ishak, M.S. and Mabry, T.J. (1997) Asian J. Chem., 9, 551], methylene-dioxypterocarpan (MIS6) [Saxena, V.K. and Nigam, S. (1997) Fitoterapia, 68, 343-345], pterocarpane (MIS2) [Saxena, V.K. and Nigam, S. (1997) J. Institution Chem. 68, 122-125] and prenylated pterocarpan [Saxena, V.K. and Nigam, S. (1997) Fitoterapia, 68, 403-407] from this plant. Here, we report the isolation of the new flavone glycoside 5,7,4'-trihydroxy-6,3'-dimethoxyflavone-7-O-alpha-L-arabinopyranosyl(1-->6)-O-beta-D-galactopyranoside (1) from the seeds of this plant.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

490. Interference of three weed extracts on uptake of nutrient in three different varieties of paddy through radio tracer techniques

By Saxena S; Sharma K; Kumar Surendra; Sand N K; Rao P B

From Journal of environmental biology / Academy of Environmental Biology, India (2004), 25(4), 387-93, Language: English, Database: MEDLINE

Interference of three dominant weed extracts viz., *Ageratum conyzoides* L., *Melilotus indica* All. and *Parthenium hysterophorus* L. were examined on seed germination, seedling growth, and nutrient uptake (32P and 65Zn) in three different varieties (PD-10, PD-12 and PB) of paddy (*Oryza sativa* L.). Among the three different varieties irrespective of weed extracts, PD-10 and PD-12 were resistant and PB was susceptible in terms of seed germination, radicle length and plumule dry weight; and PD-12 and PB were resistant and susceptible, respectively, in terms of plumule length and total seedling dry weight. *A. conyzoides* caused maximum reduction in seed germination and *M. indica* in seedling growth in different varieties of paddy. The weed extracts interfered in uptake of both 32P and 65Zn and there was a gradual decrease in uptake of both nutrients with increasing concentration of extracts in both root and shoot. The uptake of 32P and 65Zn was more inhibitory with the extracts of *A. conyzoides* and *M. indica*, respectively in different varieties. The inhibition in seed germination, seedling growth and nutrient uptake may be due to the presence of phenolics and other secondary metabolites. The phenolics such as gallic, vanillic, protocatechuic and p-hydroxybenzoic acids were identified from these weed extracts.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

491. Grafting between model legumes demonstrates roles for roots and shoots in determining nodule type and host/rhizobia specificity

By Lohar Dasharath P; VandenBosch Kathryn A

From Journal of experimental botany (2005), 56(416), 1643-50, Language: English, Database: MEDLINE

Previous grafting experiments have demonstrated that legume shoots play a critical role in symbiotic development of nitrogen-fixing root nodules by regulating nodule number. Here, reciprocal grafting experiments between the model legumes *Lotus japonicus* and *Medicago truncatula* were carried out to investigate the role of the shoot in the host-specificity of legume-rhizobia symbiosis and nodule type. *Lotus japonicus* is nodulated by *Mesorhizobium loti* and makes determinate nodules, whereas *M. truncatula* is nodulated by *Sinorhizobium meliloti* and makes indeterminate nodules. When inoculated with *M. loti*, *L. japonicus* roots grafted on *M. truncatula* shoots produced determinate nodules identical in appearance to those produced on *L. japonicus* self-grafted roots. Moreover, the hypernodulation phenotype of *L. japonicus* har1-1 roots grafted on wild-type *M. truncatula* shoots was restored to wild type when nodulated with *M. loti*. Thus, *L. japonicus* shoots appeared to be interchangeable with *M. truncatula* shoots in the *L. japonicus* root/*M. loti* symbiosis. However, *M. truncatula* roots grafted on *L. japonicus* shoots failed to induce nodules after inoculation with *S. meliloti* or a mixture of *S. meliloti* and *M. loti*. Instead, only early responses to *S. meliloti* such as root hair tip swelling and deformation, plus induction of the early nodulation reporter gene MtENOD11:GUS were observed. The results indicate that the *L. japonicus* shoot does not support normal symbiosis between the *M. truncatula* root and its microsymbiont *S. meliloti*, suggesting that an unidentified shoot-derived factor may be required for symbiotic progression in indeterminate nodules.

~5 Citings

Copyright © 2015 U.S. National Library of Medicine.

492. nifH promoter activity is regulated by DNA supercoiling in *Sinorhizobium meliloti*

By Liu Yan-Jie; Hu Biao; Zhu Jia-Bi; Shen Shan-Jiong; Yu Guan-Qiao

From Acta biochimica et biophysica Sinica (2005), 37(4), 221-6, Language: English, Database: MEDLINE

In prokaryotes, DNA supercoiling regulates the expression of many genes; for example, the expression of *Klebsiella pneumoniae* nifLA operon depends on DNA negative supercoiling in anaerobically grown cells, which indicates that DNA supercoiling might play a role in gene regulation of the anaerobic response. Since the expression of the nifH promoter in *Sinorhizobium meliloti* is not repressed by oxygen, it is proposed that the status of DNA supercoiling may not affect the expression of the nifH promoter. We tested this hypothesis by analyzing nifH promoter activity in wild-type and gyr- *Escherichia coli* in the presence and absence of DNA gyrase inhibitors. Our results show that gene expression driven by the *S. meliloti* nifH promoter requires the presence of active DNA gyrase. Because DNA gyrase increases the number of negative superhelical turns in DNA in the presence of ATP, our data indicate that negative supercoiling is also important for nifH promoter activity. Our study also shows that the DNA supercoiling-dependent *S. meliloti* nifH promoter activity is related to the trans-acting factors NtrC and NifA that activate it. DNA supercoiling appeared to have a stronger effect on NtrC-activated nifH promoter activity than on NifA-activated promoter activity. Collectively, these results from the *S. meliloti* nifH promoter model system seem to indicate that, in addition to regulating gene expression during anaerobic signaling, DNA supercoiling may also provide a favorable topology for trans-acting factor binding and promoter activation regardless of oxygen status.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

493. Positional analysis of a gene related to salt tolerance in *Sinorhizobium meliloti* by transposon rescue

By Li Xiao-Hong; Du Bing-Hai; Zhang Xiao-Qing; Wang Lei; Yang Su-Sheng

From Yi chuan xue bao = Acta genetica Sinica (2004), 31(1), 91-6, Language: Chinese, Database: MEDLINE

Salt sensitive mutant 042BML-2 was obtained by mutating *Sinorhizobium meliloti* 042BM with transposon Tn5 carried on the plasmid pRL1063a. By transposon rescue, a 1.179 kb of DNA sequence of *S. meliloti* flanking the Tn5 insertion site was obtained. The sequence similarity analysis through BLAST analysis in GenBank revealed the transposon was inserted into a functionally unknown gene, which is 6 270 bp in length, of *S. meliloti*, and the gene was named rtsC. This study indicated that rtsC was associated with salt tolerance in *S. meliloti* 042BM. Hydrophobicity profile analysis of the putative amino acid sequence showed that two predicted transmembrane domains existed in N-terminal portion of RtsC. The significance of RtsC protein in the salt-tolerance in *S. meliloti* was discussed.

~0 Citings

Copyright © 2015 U.S. National Library of Medicine.

494. Effectiveness of phytoremediation as a secondary treatment for polycyclic aromatic hydrocarbons (PAHs) in composted soil

By Parrish Zakia D; Banks M Katherine; Schwab A Paul

From International journal of phytoremediation (2004), 6(2), 119-37, Language: English, Database: MEDLINE

A greenhouse study was conducted over a 12-month period to investigate the fate of polycyclic aromatic hydrocarbons (PAHs) in soil using phytoremediation as a secondary treatment. The soil was pretreated by composting for 12 weeks, then planted with tall fescue (*Festuca arundinacea*), annual ryegrass (*Lolium multiflorum*), and yellow **sweet clover** (*Melilotus officinalis*). Two sets of unvegetated controls also were evaluated, one fertilized and one unfertilized. Total PAH concentrations decreased in the tall fescue, annual ryegrass, and yellow **sweet clover** treatments by 23.9%, 15.3%, and 9.1%, respectively, whereas the control was reduced by less than 5%. The smaller two- and most of the three-ring compounds--naphthalene, acenaphthylene, acenaphthene, fluorene, and anthracene--were not found in detectable concentrations in any of the treatments. The most probable number analysis for microbial PAH degraders did not show any statistically significant differences among treatments. There were significant differences among treatments ($p < 0.05$) for the residual concentrations of five of the target PAHs. Root surface area measurements **indicated** that tall fescue and annual ryegrass both had significantly higher root surface area than yellow **sweet clover**, although the two species were not significantly different from each other. The tall fescue treatment resulted in the highest root and shoot biomass, followed by annual ryegrass and yellow **sweet clover**, and also had the highest percent of contaminant removal after 12 months. These results imply a positive relationship between plant biomass development and PAH biodegradation.

~1 Citing

Copyright © 2015 U.S. National Library of Medicine.

495. FixJ-regulated genes evolved through promoter duplication in *Sinorhizobium meliloti*

By Ferrieres Lionel; Francez-Charlot Anne; Gouzy Jerome; Rouille Stephane; Kahn Daniel

From Microbiology (Reading, England) (2004), 150(Pt 7), 2335-45, Language: English, Database: MEDLINE

The FixLJ two-component system of *Sinorhizobium meliloti* is a global regulator, turning on nitrogen-fixation genes in microaerobiosis. Up to now, *nifA* and *fixK* were the only genes known to be directly regulated by FixJ. We used a genomic SELEX approach in order to isolate new FixJ targets in the genome. This led to the identification of 22 FixJ binding sites, including the known sites in the *fixK1* and *fixK2* promoters. FixJ binding sites are unevenly distributed among the three replicons constituting the *S. meliloti* genome: a majority are carried either by *pSymA* or by a short chromosomal region of non-chromosomal origin. Thus FixJ binding sites appear to be preferentially associated with the *pSymA* replicon, which carries the *fixJ* gene. Functional analysis of FixJ targets led to the discovery of two new FixJ-regulated genes, *smc03253* and *proB2*. This FixJ-dependent regulation appears to be mediated by a duplication of the whole *fixK* promoter region, including the beginning of the *fixK* gene. Similar duplications were previously reported for the *nifH* promoter. By systematic comparison of all promoter regions we found 17 such duplications throughout the genome, **indicating** that promoter duplication is a common mechanism for the evolution of regulatory pathways in *S. meliloti*.

~6 Citings

Copyright © 2015 U.S. National Library of Medicine.

496. Six nonnodulating plant mutants defective for Nod factor-induced transcriptional changes associated with the legume-rhizobia symbiosis

By Mitra Raka M; Shaw Sidney L; Long Sharon R

From Proceedings of the National Academy of Sciences of the United States of America (2004), 101(27), 10217-22, Language: English, Database: MEDLINE

As the legume-rhizobia symbiosis is established, the plant recognizes bacterial-signaling molecules, Nod factors (NFs), and initiates transcriptional and developmental changes within the root to allow bacterial invasion and the construction of a novel organ, the nodule. Plant mutants defective in nodule initiation (Nod(-)) are thought to have defects in NF-signal transduction. However, it is unknown whether WT plants respond to NF-independent bacterial-derived signals or whether Nod(-) plant mutants show defects in global symbiosis-associated gene expression. To characterize plant gene expression in the establishment of the symbiosis, we used an Affymetrix oligonucleotide microarray representing 9,935 *Medicago truncatula* expressed sequences. We identified 46 sequences that are differentially expressed in plants exposed for 24 h to WT *Sinorhizobium meliloti* or to the invasion defective *S. meliloti* mutant, *exoA*. Eight of these genes encode nucleolar proteins, which are implicated in ribosome biogenesis. We also identified differentially expressed transcription factors, signaling components, defense response proteins, stress response proteins, and several previously uncharacterized genes. NF appears both necessary and sufficient to induce most changes. Six of seven Nod(-) *M. truncatula* mutants (*nfp*, *dmi1*, *dmi2*, *dmi3*, *nsp1*, and *nsp2*) showed no transcriptional response to *S. meliloti*, suggesting that the encoded proteins are required for initiating new transcription. The Nod(-) mutant *hcl*, however, exhibits a reduced transcriptional response to *S. meliloti*, indicating that the machinery responsible for initiating new transcription is at least partially functional in this mutant.

~34 Citings

Copyright © 2015 U.S. National Library of Medicine.

497. *Sinorhizobium meliloti* sulfotransferase that modifies lipopolysaccharide

By Cronan Glen E; Keating David H

From *Journal of bacteriology* (2004), 186(13), 4168-76, Language: English, Database: MEDLINE

Sinorhizobium meliloti is a gram-negative soil bacterium found either in free-living form or as a nitrogen-fixing endosymbiont of a plant structure called the nodule. Symbiosis between *S. meliloti* and its plant host alfalfa is dependent on bacterial transcription of nod genes, which encode the enzymes responsible for synthesis of Nod factor. *S. meliloti* Nod factor is a lipochitooligosaccharide that undergoes a sulfate modification essential for its biological activity. Sulfate also modifies the carbohydrate substituents of the bacterial cell surface, including lipopolysaccharide (LPS) and capsular polysaccharide (K-antigen) (R. A. Cedergren, J. Lee, K. L. Ross, and R. I. Hollingsworth, *Biochemistry* 34:4467-4477, 1995). We utilized the genomic sequence of *S. meliloti* to identify an open reading frame, SMc04267 (which we now propose to name *lpsS*), which encodes an LPS sulfotransferase activity. We expressed *LpsS* in *Escherichia coli* and demonstrated that the purified protein functions as an LPS sulfotransferase. Mutants lacking *LpsS* displayed an 89% reduction in LPS sulfotransferase activity *in vitro*. However, *lpsS* mutants retain approximately wild-type levels of sulfated LPS when assayed *in vivo*, indicating the presence of an additional LPS sulfotransferase activity(ies) in *S. meliloti* that can compensate for the loss of *LpsS*. The *lpsS* mutant did show reduced LPS sulfation, compared to that of the wild type, under conditions that promote nod gene expression, and it elicited a greater number of nodules than did the wild type during symbiosis with alfalfa. These results suggest that sulfation of cell surface polysaccharides and Nod factor may compete for a limiting pool of intracellular sulfate and that *LpsS* is required for optimal LPS sulfation under these conditions.

~9 Citings

Copyright © 2015 U.S. National Library of Medicine.

498. The expression of MaEXP1, a *Melilotus alba* expansin gene, is upregulated during the sweetclover-*Sinorhizobium meliloti* interaction

By Giordano Walter; Hirsch Ann M

From *Molecular plant-microbe interactions* : MPMI (2004), 17(6), 613-22, Language: English, Database: MEDLINE

Expansins are a highly conserved group of cell wall-localized proteins that appear to mediate changes in cell wall plasticity during cell expansion or differentiation. The accumulation of expansin protein or the mRNA for specific expansin gene family members has been correlated with the growth of various plant organs. Because expansin proteins are closely associated with plant cell wall expansion, and as part of a larger study to determine the role of different gene products in the legume-Rhizobium spp. symbiosis, we investigated whether a *Melilotus alba* (white sweetclover) expansin gene is expressed during nodule development. A cDNA fragment encoding an expansin gene (EXP) was isolated from *Sinorhizobium meliloti*-inoculated sweetclover root RNA by reverse-transcriptase polymerase chain reaction using degenerate primers, and a full-length sweetclover expansin sequence (MaEXP1) was obtained using 5' and 3' rapid amplification of cDNA end cloning. The predicted amino acid of the sweetclover expansin is highly conserved with the various alpha-expansins in the GenBank database. MaEXP1 contains a series of eight cysteines and four tryptophans that are conserved in the alpha-expansin protein family. Northern analysis and whole-mount *in situ* hybridization analyses indicate that MaEXP1 mRNA expression is enhanced in roots within hours after inoculation with *S. meliloti* and in nodules. Western and immunolocalization studies using a cucumber expansin antibody demonstrated that a cross-reacting protein accumulated in the expanding cells of the nodule.

~5 Citings

Copyright © 2015 U.S. National Library of Medicine.

499. Use of *Sinorhizobium meliloti* as an indicator for specific detection of long-chain N-acyl homoserine lactones

By Llamas Inmaculada; Keshavan Neela; Gonzalez Juan E

From *Applied and environmental microbiology* (2004), 70(6), 3715-23, Language: English, Database: MEDLINE

Population-density-dependent gene expression in gram-negative bacteria involves the production of signal molecules characterized as N-acyl homoserine lactones (AHLs). The synthesis of AHLs by numerous microorganisms has been identified by using biosensor strains based on the *Agrobacterium tumefaciens* and *Chromobacterium violaceum* quorum-sensing systems. The symbiotic nitrogen-fixing bacterium *Sinorhizobium meliloti* is rapidly becoming a model organism for the study of quorum sensing. This organism harbors at least three different quorum-sensing systems (Sin, Mel, and Tra), which play a role in its symbiotic relationship with its host plant, alfalfa. The Sin system is distinguished among them for the production of long-chain AHLs, including C(18)-HL, the longest AHL reported so far. In this work, we show that construction of a *sinI::lacZ* transcriptional fusion results in a strain that detects long-chain AHLs with exquisite sensitivity. Overexpression of the SinR regulator protein from a vector promoter increases its sensitivity without loss of specificity. We also show that the resulting indicator strain can recognize long-chain AHLs produced by unrelated bacteria such as *Paracoccus denitrificans* and *Rhodobacter capsulatus*. This *S. meliloti* indicator strain should serve as a tool for the specific detection of long-chain AHLs in new systems.

~13 Citings

Copyright © 2015 U.S. National Library of Medicine.

500. The *typA* gene is required for stress adaptation as well as for symbiosis of *Sinorhizobium meliloti* 1021 with certain *Medicago truncatula* lines

By Kiss Erno; Huguet Thierry; Poinot Verena; Batut Jacques

From *Molecular plant-microbe interactions : MPMI* (2004), 17(3), 235-44, Language: English, Database: MEDLINE

In this article, we describe the *typA* gene of *Sinorhizobium meliloti*, the orthologue of *typA/bipA* genes found in a wide range of bacteria. We found that *typA* was required for survival of *S. meliloti* under certain stress conditions, such as growth at low temperature or low pH and in the presence of sodium dodecyl sulfate (SDS). The cold-sensitive phenotype of both *Escherichia coli* *bipA* and *S. meliloti* *typA* mutants were cross-complemented, indicating that the two genes are functionally equivalent. *typA* was indispensable for symbiosis on *Medicago truncatula* Jemalong and F83005.5 and contributes to the full efficiency of symbiosis on other host plant lines such as DZA315.16 or several cultivars of *M. sativa*. Hence, the symbiotic requirement for *typA* is host dependent. Interestingly, the symbiotic defect was different on Jemalong and F83005.5 plants, thus indicating that *typA* is required at a different stage of the symbiotic interaction.

~14 Citings

Copyright © 2015 U.S. National Library of Medicine.