


During 1996-2002, soil samplings were performed three times per year in a crop rotation experiment established in 1963 at INIA la Estanzuela, Uruguay. Soil population of *Fusarium oxysporum* and pathogen potential were estimated for four cropping systems differing in the pasture type (legume or grass-legume) and pasture duration (0-4 years). Recovery of *F. oxysporum*, the primary pathogen associated with crown and root rot of forage legumes, was proportional to the time that the soil remained under legume pasture. Average CFU/g of soil were 1678, 2967, 2990 and 3934, for 100% agriculture – no pasture, 50% agriculture – 50% birdsfoot trefoil pasture, 50% agriculture – 50% grass-legume pasture and 33% agriculture – 66% red clover and grass-legume pasture, respectively. Isolates of *F. oxysporum* recovered from different systems were pathogenic to seed and seedlings of birdsfoot trefoil and red clover; however, significant differences in aggressiveness were observed among them. Isolate aggressiveness to birdsfoot trefoil was higher than to red clover, as expressed by percentage of surviving plants (28.7% and 58.6%, respectively). When sown in soil under legume pasture, birdsfoot trefoil productivity was significantly more depressed than red clover productivity, as expressed by emergence and total biomass. The highest pathogen potential to both legume species was recorded under the system with 50% birdsfoot trefoil pasture. We concluded that the crop sequence that characterizes each system has a long-term effect on the soil fungal populations. Thus, crop rotation needs to be considered as a means for disease management, which contributes toward legume persistence and sustainable cropping systems.


ARANGO N., JACOBS B.C. and BLUMENTHAL M.J. 1998. Seed production of *Lotus uliginosus*


**Ayres J.F.** 2002. Co-learning in pasture R&D – the lotus project. District Agronomists Conference held at the Orange campus of the University of Sydney, 5-7 February 2002.


The biomass allocation analysis and the correlation among morphophysiological variables allow greater understanding of the establishment, yield and persistence of perennial species in plant breeding projects, management and ecology of forage plants. To analyze the biomass allocation of forage legumes (Adesmia latifolia, A. punctata, A. tristis, Lotus corniculatus, L. uliginosus), an experiment was carried out under greenhouse conditions for 210 days (4000 degree-days); the plants were cultivated in 1 m² wooden boxes. Plants were harvested to evaluate the morphological components and to describe their growth habit. The root, stem and leaf biomass allocations were expressed as dry mass percentages. The greatest allocation on leaves occurred for stoloniferous species, A. latifolia (63.5%) and A. punctata (61.4%), which presented the smallest allocation for roots, 10.9 and 14.7%, respectively. Largest stem biomass allocation (39.4%) and roots (24.4%) were found for L. uliginosus, a species with rhizomes. The leaf area index (LAI) was positively correlated with the number of leaves, secondary stems and aerial biomass. A. latifolia and Lotus spp. are extreme examples of the relative importance of morphological components in the formation of LAI and biomass. The accumulation pattern and forage allocation of stoloniferous legumes are mainly characterized by leaf production, pointing out the importance of stolon elongation and rooting, while for A. tristis and Lotus spp., the stem and root fractions had the same importance.


The genus Adesmia DC. has 17 indigenous species from southern Brazil. The species grow during winter-spring, and their forage potential has recently been studied. This work had as objective to observe the dynamics of bud (B), leaves (L) and stems (S) formation of A. latifolia, A. tristis and A. punctata, using Lotus corniculatus (birdsfoot-trefoil) and L. uliginosus as control species. The assay was conducted under greenhouse conditions, during 210 days (4000 degrees-days); during this period the plants were harvested six times, to evaluate the morphological components. There was a positive response of these variables to the accumulation of degrees day. The densities of B/m2 were, in average,
The species of Lotus spp. showed a greater degree of branching (3600 S/m2) and leaf formation, estimated in 15500 L/M2 for birdsfoot-trefoil. In the stoloniferous, A. latifolia and A. punctata, the average percent of stems of the stolon type was approximately 90% and 50%, respectively, at the pre-inflorescence stage. A. tristis and birdsfoot-trefoil, with an erect growth habit, maintained a mixed population of erect and prostrate stems, while the rhizomatous L. uliginosus, showed 11% of rhizomes at the end of the experimental period. All legumes, but L. uliginosus, reached the flowering stage. A. latifolia maintained about 95 to 99% of its buds at the soil surface level (at the stolon nodes), a desirable characteristic for continuously grazed plants.


The genus Adesmia DC. has 17 species native to Brazil, distributed in the Southern states, whose importance is linked to its adaptation to the soils and climatic conditions of the region, besides being an active winter-growing species (temperate). This work aimed to compare the patterns of dry matter (DM) accumulation and nutritive value of A. latifolia, A. punctata and A. tristis, using Lotus corniculatus (birdsfoot trefoil) and L. uliginosus (big trefoil), as checks. The experiment was carried out in the greenhouse for 210 days (4000 degrees-day). The forage availability (FA) was similar for A. latifolia (276 g DM/m²) and birdsfoot trefoil (275 g DM/m²), as well as for A. tristis (201 g DM/m²) and big trefoil (192 g DM/m²), while A. punctata showed the smallest FD (155 g DM/m²). A. latifolia was characterized by an early FA, due to its fast growth when compared to other species, pointing to its potential utilization during the cold season. In relation to the quality analysis, the crude protein (CP) in A. latifolia leaves was up to 21.6% and the organic matter in vitro digestibility (OMIVD) was up to 72.3%. The highest CP and OMIVD was found in the birdsfoot trefoil leaves, 30.3 and 75.8%, respectively. A. tristis presented a very low OMIVD in the stems, from 34.9 to 44.7%, which could limit its intake by cattle. It is concluded that, among the Adesmia species studied, A. latifolia holds the greatest forage potential and deserves further study.


The objective of this work was to assess the genetic variability of different Crioula alfalfa and São Gabriel birdsfoot trefoil populations to grazing tolerance and to select plants more adapted to grazing. The plants were submitted to a heavy and continuous grazing (3-5 cm stubble). At the end of the experimental period there were significant differences (P<0.05) among alfalfa populations but there were no consistent differences among birdsfoot trefoil treatment, which presented a higher percentage of surviving plants. The alfalfa’s morphological and physiological characteristics were evaluated in order to correlate then with grazing resistance. The results did not show significant differences (P>
0.05) among the genotypes in relation to crow contraction, crow area, leaf area, number of stems per plant, type of stem per plant (basilar or axillary), nitrogen content and non-structural carbohydrates of the roots. Greenhouse trials have identified morphological markers on alfalfa and birdsfoot trefoil seedlings, which allowed an early identification of genotypes with grazing aptitude. In a greenhouse trial, the effectiveness of the recommend birdsfoot trefoil *Rhizobium* strains was evaluated in comparison with new strains collected, showing the possibility to isolate new strains. These results allowed the proposition of a new plant functional descriptor named specific buds for characterization of grazing aptitude. Besides that, the term grazing aptitude is proposed to replace grazing tolerance.


http://www.ag.auburn.edu/argentina/pdfmanuscripts/delafuente2.pdf


Pseudomonas fluorescens strains UP61, UP143 and UP148, isolated from Uruguayan soils, have shown the ability to control soil-borne fungal pathogens that cause damping-off in birdsfoot trefoil. In this communication, we study the effect of these strains on the symbiotic efficiency of rhizobia from commercial inoculants in birdsfoot trefoil, alfalfa and white clover. Shoot dry weights and the rate of nodulation by rhizobia were not modified by the presence of Pseudomonas strains, despite antagonistic activity against rhizobia in vitro. Survival of P. fluorescens UP61 and rhizobia on roots in non-sterile soil were not affected by co-inoculation of the selected forage legumes.


GORDON A.J., SKOT L., MINCHIN F.R., WEBB K.J., WANG T.L., HEDLEY C.L., CRAIG J. and


The persistence of hard-seeded perennial legumes can be facilitated by breeding and management programs that enhance seedling recruitment and maintain plant population density. In northern New South Wales, day-length limits optimal flowering intensity and seed set of the otherwise promising birdsfoot trefoil cultivar, Grasslands Goldie (*Lotus corniculatus* L.). We studied the feasibility of improving flowering and seed production traits in this cultivar. To measure the extent of genetic variation for seed yield components, half-sib families derived from 45 parent plants collected from a population of cv. Goldie collected from Inverell, New South Wales were grown in the field at Glen Innes NSW and Canberra ACT. Flowering time, flowering intensity and seed yield components (umbels per stem, pods per umbel, pods per stem, seeds per pod and seed mass) were recorded at both sites, while plant weight, height and width were also measured at the Canberra site. There was significant genetic variation among half-sib families and high narrow-sense heritabilities (on a family mean basis) for flowering time (0.73 ± 0.11), flowering intensity (0.66 ± 0.12) and plant height (0.78 ± 0.10). High estimates of narrow-sense heritability for seed yield components indicated that selection advance would be achieved under both sward and spaced plant conditions. There was evidence that selection for prolific flowering in cv. Grasslands Goldie was associated in the progeny populations with an increase in the number of umbels per stem. This component is a readily measured indicator of flowering intensity and should prove useful in developing more prolific and persistent populations from further selection within cv. Goldie and other birdsfoot trefoil populations.


Study of geographical variation pattern of 18 morphological characters of *Lotus corniculatus* L. s. l. and their relations to variation of macroclimate has been conducted. Polymorphism of the majority of the characters in most populations has been established. Some characters (especially calyx and leaves hair density, length to width ratio for leaflets of a compound leaf, flower size) showed a tendency to clinal variation pattern from north-west to south-east. Mean value correlation between hair density and leaflets size and climatic parameters can suggest their adaptability.


The variability in twenty morphological characters was studied in 54 local populations of *Lotus corniculatus* L. complex in the European part of Russia and adjacent areas. Chromosome numbers
were counted for samples taken from 15 locations. A tendency towards a clinal variation has been demonstrated for several characters, especially for leaflets indexes, indumentum density and flower length. Correlations between some morphological characters (leaflets size, indumentum density and others) and climate parameters have been revealed. On the basis of a factor analysis, four species are distinguished in the complex occurring in the study area: \( L. krylovii \) Schischk. et Serg. \((2n=12)\), \( L. tenuis \) Waldst. et Kit. ex Willd. \((2n=12)\), \( L. ucrainicus \) Klok. \((2n=12)\), and \( L. corniculatus \) L. \((2n=24)\).


A new species, \( Lotus \) \textit{stepposus} Kramina, distributed in steppe areas of European Russia (and partly in Siberia), Ukraine, Moldova, Romania, Kazakhstan and Turkey is described. The species is characterized by diploid chromosome number \( 2n=12 \). Its relations to \( L. tenuis \) Waldst. et Kit. ex Willd. (=\( L. \) \textit{glaber} Mill.) and \( L. corniculatus \) L. \( s. \) \textit{str.} are discussed.


Anatomical structure of vegetative organs (i.e. stems, leaves, and roots) in *Lotus corniculatus* L. var. *japonicus* Regel, *L. corniculatus* var. *corniculatus*, *L. krylovii* Schischk. et Serg. and discovered in Miyako-jima island in the south of Japan *L. sp. nova* has been examined. The first two taxa are perennials and the last two are predominantly annuals. Some difference in microstructure of vegetative organs between studied taxa has been revealed. The roots of *L. krylovii* and *L. sp. nova* are characterized by thin cork with small number of layers and by the absence of reserve starch that is connected with their annual life cycle. Leaves of *L. sp. nova* distinguish from those of other studied taxa by the highest number of mesophyll layers and the highest ratio of palisade to spongy mesophyll thickness. *L. corniculatus* var. *japonicus* has no additional bundles in stems that are usual for other taxa.


Stylodium morphology in 62 species of *Lotus* is studied. In *Lotus creticus*, a stylodium tooth is detected for the first time. Therefore, *L. creticus* should be transferred from subgenus *Edentolotus* into subgenus *Pedrosia*. *L. cytisoides* and *L. longisiliquosus* which were often indicated as scarcely distinguishable from *L. creticus*, are retained in the subgenus *Edentolotus* and can be easily separate from each other if *L. creticus* is excluded from the subgenus.


A new monotypic genus *Kebirita* Kramina et D.D.Sokoloff (= *Lotus* sect. *Pseudosimpeteria* Kramina et D.D.Sokoloff) is described from NW Africa. These are perennial herbs without rhizomes with pinnate leaves with 3-6 usually alternate leaflets and glandular stipules. They possess one-flowered umbels on short peduncles. On the peduncle there are two opposite small scaly leaves, one of them is the flower.
covering leaves. There are no leaves with normally developed blade on the peduncle. Ovules micropylae alternates. Pollen grains with 3 apertures. The single species of the genus, *Kebirita roudairei* (Bonnet) Kramina et D.D.Sokoloff (= *Lotus roudairei* Bonnet), is distributed in arid areas of Algeria, Tunisia, Morocco, Mauritania and West Sahara.


Sect. *Erythrolotus* is accepted in narrow sense, comprising only *L. conimbricensis* Brot., the species which was selected as a lectotype of the section. *L. conimbricensis* share with members of sect. *Lotus* mainly Mediterranean distribution and base chromosome number *x*=6. *L. conimbricensis* is characterised by long and narrow, incurved and tardily dehiscent fruit. The majority of species traditionally included in section *Erythrolotus* is placed now in the section *Heinekenia* Webb et Berth. A new section, *Chamaelotus* is described to include three annual species with shortened peduncles and small pink or red flowers. A new combination at sectional level is made, namely sect. *Benedictella* (Maire) Kramina et D.D. Sokoloff. The section *Benedictella* is monotypic and includes *L. benoistii* (Maire) Lassen from Morocco.


The study of variability limits and estimation of diagnostic values of 18 morphological characters, being usually referred to in determination of taxa within the *Lotus corniculatus* L. s. l. complex from the European part of the USSR have been carried out, basing on the data of samples from 22 local populations. Each character was shown to be of overlapping variability within the adjacent populations, representing the argument against the independence of the studied races (*L. ucrainicus* Klok., *L. ruprechtii* Min., *L. balticus* Min., *L. zhegulensis* Klok., *L. callunetorum* (Juxip.) Min., and *L. corniculatus* L. s. str.). The received data require further examination with the help of multidimensional methods.


The establishment of *Lotus tenuis* Waldst et Kit. (narrowleaf birdsfoot trefoil) can interfere with colonisation by *Carduus acanthoides* L. (musk thistle) during the early postburn recovery of Flooding Pampa grasslands. The purpose of this research was to determine the potential role of *L. tenuis* seeds as source of allelopathic compounds involved in that interaction. Imbibed seeds of *L. tenuis* and aqueous leachates from them were bioassayed for their ability to inhibit germination and seedling growth of *C. acanthoides*, both on sterilised filter paper and on pasteurized soil as substrata. Germination or emergence of *C. acanthoides* were inhibited and root length was reduced on filter paper or soil, by both the presence of *L. tenuis* seeds and by their leachate, at densities of *L. tenuis* near the maximum values observed in the field. Germination and seedling growth of *C. acanthoides* were less affected by the presence of *L. tenuis* seeds than by the addition of their leachate, and the presence of *L. tenuis* seeds or their leachate showed stronger effects on emergence of *C. acanthoides* from soil than on its germination on filter paper. Methods applied for leachate sterilization, ultrafiltration or autoclaving, did not modify *C. acanthoides* responses. Neither the germination rate nor the root length of *C. acanthoides* seedlings were affected by solutions of polyethylene glycol with similar osmolarity to the leachates. We conclude that the release of inhibitory substances onto filter paper and into pot soil from imbibed *L. tenuis* seeds would be the mechanism responsible for the observed effects.


Interactions between fire regime, dispersal strategies and patch structure were examined as key issues for the management of floristic composition of grasslands, through a model that simulates the population dynamics of two competing fire-cued and non-sprouting species. The model describes a heterogeneous environment composed by several patches of grassland, only related by seed dispersal. The last burn date at each patch determines the accumulation level of fuel-biomass provided by a third, dominant species, which in turn controls for the exclusion rate of both colonizer species. The population dynamics of both species was approached following density-dependent models and parameterized for two opposite dispersal strategies: low spatial and high temporal dispersion of seeds (type 1), high spatial and low temporal dispersion of seeds (type 2). Only under the most variable scenarios (when non-synchronous and irregular fire regimes were combined with a proportion of patches (p) with initially depleted seed banks) did the relative success of dispersal strategies vary with the length of the fire-free period. Irrespective of p, smaller interval lengths favored the postburn density of the strategy 1. Strategy 2 was favored over strategy 1 when the fire-free interval increased, such difference being maximum for intermediate p values. These general tendencies agree with those observed from a reference system: the Flooding Pampa grasslands dominated by *Paspalum quadrifarium* where short no-fire intervals promote the postburn abundance of a type 1 species (*Lotus tenuis*) over two type 2 species (*Carduus acanthoides* and *Cirsium vulgare*) while for long fire-free intervals the opposite is true. These results suggest that frequency, time since last burn, and burning synchrony are useful components of a fire regime to take advantage of variation in dispersal strategies.


In order to test for cumulative effects of fire on *Paspalum quadrifarium*-dominated grasslands (“pajonal”), we analyzed the impact of single and repeated fires on the community structure and post-fire recovery of canopy after a final, simultaneous fire event. Nine plots were defined within a homogeneous pajonal stand, and treatments of low (LF), medium (MF) and high frequency (HF) of fire were defined by the application of one, two or four cold-season burnings, respectively, along a six-year period. Both burned and unburned plots were exposed to grazing by cattle during the summer following the first and the third years of that period. High cattle preference for burned sites conditioned fire temperature and vegetation responses to the following burning events. Cumulative effects between successive burning events were observed on the cover of basal area of the dominant and other sprouter species, the cover and thickness of the litter layer, the seed bank size of the principal recruiter species, and the floristic composition. While light interception by the canopy was positively related to fire frequency during the early growth season, further growth of *P. quadrifarium* determined a greater light interception in LF than in MF and HF. These patterns of light interception were associated with a faster occupation of the between-tussock areas by opportunistic species in plots subjected to frequent fires (HF and MF) than in plots with low fire frequency (LF), and a more lasting regrowth of *P. quadrifarium* in the LF plot than in the HF ones. High fire frequencies reduced the dominance of *P. quadrifarium*. Percent of species classified as subordinated graminoids or forbs did not vary among treatments. However, the abundance of different forb species was differentially favored by contrasting frequencies of fire, describing some coarse relationships between their specific responses and their dispersal strategies.


A new species of *Lotus* is described from Malawi. It differs from related species by leaves with 3, not 5 leaflets.


tannins in flowering plants of *Lotus corniculatus var japonicus* and tannin accumulation by transformed root cultures. *LOTUS* Newsletter.


In the period 1992-1996 four experiments were carried out to identify forage legumes (Lotus, Trifolium and Ornithopus) adapted to grow in the natural pastures of the northeast region of the country. Lotus was the genera better adapted when oversown in the natural pastures. The soils generally have a low P content compared to the legume requirements. In the fourth growing season 5 and 75 % of the improved pasture was Lotus corniculatus L. when 0 and 80 kg of P$_2$O$_5$ ha$^{-1}$ were applied each year. LAI of the legume increased from 1.5 to 5.0 as the P$_2$O$_5$ increased from 0 to 120 kg ha$^{-1}$. There was a strong correlation between seed production and seedling recruitment in the following season. In the first growing season 1 plant dm$^{-2}$ was recorded, while in the third recording period 3 and 6.4 plants dm$^{-2}$ were recorded when 0 and 120 kg ha$^{-1}$ of P$_2$O$_5$ were applied respectively. Based on plant survival and fecundity a model using a Leslie matrix was developed. The model emphasize the need of seedling recruitment every year to keep the introduced population in natural pasture.


Winter and Spring burnings constitute a frequent management tool of native grasslands dominated by the bunch grass Paspalum quadrifarium (hereafter "pajonal stands") in the Flooding Pampa of Argentina. In addition to increasing the primary productivity and the nutritious quality of the regrowth, this practice favours the establishment of opportunistic species, especially Lotus tenuis ("lotus"), Cirsium vulgare and Carduus acanthoides ("thistles"). The aims of the present study were to assess the effects of burning and those of the remnant litter on L. tenuis and thistle recruitment, as well as the effects of L. tenuis density on the emergence, survival and flowering of thistles. Two field experiments were carried out. In the first, a completely randomised factorial design with occurrence of L. tenuis and fire was used and, in the second, a completely randomised design with L. tenuis seed density as the only factor. Lotus tenuis and thistle recruitment within the pajonal stand was absolutely dependent on
fire. While the presence of *L. tenuis* and thistles at small spatial scale depended on nearly complete combustion of litter, early presence of thistle seedlings in denuded microsites showed a negative association with the proximity of *L. tenuis* seedlings. By the end of the first post-fire growing season, the survivorship of established thistles was linearly reduced with the sowing density of *L. tenuis*. Keeping a significant litter coverage as well as favouring the presence of a high density of *L. tenuis* in the pre-fire seed bank would constitute management measures aimed to preclude thistle invasion of burned *pajonal* stands, thus reducing the dependency on chemical control.


After burning for raising the stocking rate, the *Paspalum quadrifarium*-dominated grasslands of the Flooding Pampa become invaded by a forage legume, *Lotus tenuis*, and/or by *Cirsium vulgare* between other weed species. Aiming to compare the relative impact of *L. tenuis* on pre and post-emergence stages of *C. vulgare*, the emergence, survivorship and coverage of *C. vulgare* were evaluated in response to four sowing densities of *L. tenuis* (0.0; 0.25; 0.5 and 1.0 seeds / cm²) and two spatial patterns of *C. vulgare* (15 uniformly distributed seeds within a circle of 2.5 cm diameter and 15 evenly spaced seeds on a circle of 14 cm diameter), by using a factorial design under greenhouse conditions. The emergence of *C. vulgare* lineally declined with increasing densities of *L. tenuis*, independently of its spatial patterns of sowing. While the emergence of *C. vulgare* was reduced up to 40% by the presence of *L. tenuis*, the effects of this species on the seedling mortality of the emerged seedlings reached up to 270% of increment. In contrast with the emergence, which was mostly affected by the maximum densities of *L. tenuis*, the final coverage of *C. vulgare* was similarly reduced for the presence of *L. tenuis* irrespective of its density. This results confirm the occurrence of pre-emergent effects of *L. tenuis* seeds on *C. acanthoides* seeds, as previously detected under laboratory conditions, even under potentially adverse conditions for the activity of allelopathic compounds.


For this work, *Lotus japonicus* transgenic plants were constructed expressing a fusion reporter gene consisting of the genes β-glucuronidase (*gus*) and green fluorescent protein (*gfp*) under control of the soybean auxin-responsive promoter GH3. These plants expressed GUS and GFP in the vascular bundle of shoots, roots and leaves. Root sections showed that in mature parts of the roots GUS is mainly expressed in phloem and vascular parenchyma of the vascular cylinder. By detecting GUS activity, we describe the auxin distribution pattern in the root of the determinate nodulating legume *L. japonicus* during the development of nodulation and also after inoculation with purified Nod factors, *N*-naphthylphthalamic acid (NPA) and indoleacetic acid (IAA). Differently than white clover, which forms indeterminate nodules, *L. japonicus* presented a strong GUS activity at the dividing outer cortical cells during the first nodule cell divisions. This suggests different auxin distribution pattern between the determinate and indeterminate nodulating legumes that may be responsible of the differences in nodule development between these groups. By measuring of the GFP fluorescence expressed 21 days after treatment with Nod factors or bacteria we were able to quantify the differences in GH3 expression levels in single living roots. In order to correlate these data with auxin transport capacity we measured the auxin transport levels by a previously described radioactive method. At 48 h after inoculation with Nod factors, auxin transport showed to be increased in the middle root segment.
The results obtained indicate that *L. japonicus* transformed lines expressing the GFP and GUS reporters under the control of the GH3 promoter are suitable for the study of auxin distribution in this legume.


Seedling diseases caused by *Pythium* spp. are one of the main constraints for pasture productivity and persistence. During 1996, 1997 and 1998, experiments were conducted under field conditions to
evaluate the ability of three strains of native fluorescent Pseudomonas (UP61, UP143, UP148) that produce HCN, siderophores and antibiotics to suppress seedling diseases on Lotus corniculatus. The experimental design was a Randomized Complete Block with five replications. One hundred viable seeds were sown per plot, previously treated as follows: Mesorhizobium loti B816 with each one of the strains of Pseudomonas; M. loti B816 without Pseudomonas; M. loti B816 + metalaxyl (fungicide) sprayed on the soil. Favorable conditions for the development of damping-off only occurred during 1996 (rainfall and low temperatures). That year, despite differences were not statistically significant, the treatments inoculated with Pseudomonas had higher establishment percentage and higher dry matter production per plot than the control without Pseudomonas. In 1997 and 1998, the inoculation with Pseudomonas did not increase the number of established plants but induced an increase on dry matter production per plot suggesting the possible occurrence of an effect on plant growth promotion. The observed trends indicate that the experiments should be repeated in order to validate the practical implementation of this management strategy, under the various soil and environmental conditions and microbial community structures found in Uruguay.


The objective of this work was to select rhizobium isolates for birdsfoot trefoil, ‘Lotus corniculatus’, by collecting nodules on plants on four cities of Rio Grande do Sul. Through a collaborative work between MIRCEN-FEPAGRO and UFRGS it was possible to characterize the collected material by using immuno-specific serum. The isolated characterization has revealed the existence of antigenic variability. After the characterization the isolated were tested in a complete block design experiment in the greenhouse with three replicates. The results indicated that there is variability for the isolates and that it is possible to select isolated more efficient than the ones that are recommended.


The production of seeds of Lotus corniculatus is a very important item within the Uruguayan farming system, especially in the southern-coast region. The loss of seeds caused by the "leguminous seed wasp" (Bruchophagus platypterus Walker) has been observed and mentioned in several publications but no quantification of these losses has been made. With the purpose of doing so and in an attempt to evaluate the incidence of the damage produced at different dates during the flowering stage, an experiment on a land-parcel basis was carried out during the '88-'89 crop. The experiment in question
was carried out at La Estanzuela, in Colonia. During November and December, open flowers were remarked the same day they opened and the pods were separately harvested, and manually thrashed. Furthermore, the count of sound seeds and pods damaged by the wasps was carried out the different dates. The count of wasps and parasites was also made on each flowering date. The damage caused was expressed as the coefficient between the number of damaged seeds and the number of sound seeds, and the relative incidence of parasitoids was expressed as the coefficient between the number of parasitoids and the number of wasps. The highest damage levels were recorded during the earlier dates of flowering (39.6% and 37.7% on 9.11.88 and 16.11.88, respectively) while the lower levels were observed at the end of the period under analysis (4.46% and 5.01% on 6.12.88 and 14.12.88, respectively). In accordance with the results obtained, it was possible to corroborate the existence of *Bruchophagus platypterus* in *Lotus corniculatus*, as well as the direct damage it causes on the yield of seeds. It was furthermore proved that the number of wasps is regulated by parasitoids.


A five-year project was undertaken in New South Wales, Australia to develop and implement lotus pasture technology (Greater lotus, *Lotus uliginosus*; birdsfoot trefoil, *Lotus corniculatus*). The project was modelled on a core experiment/co-learning paradigm. A core experiment investigated issues of species adaptation and grazing management, and a co-learning phase aimed at promoting simultaneous, improvement and adoption of lotus technology. Most participants felt that involvement with co-learning gave them increased technical knowledge of lotus. Increased knowledge facilitated changes that included farming practice changes (such as establishing lotus pastures or modifications to grazing
management), or changing the approach to learning and problem solving towards a co-learning mode. The strengths of the co-learning model were that it was flexible, farmers and industry sponsors worked together, and it increased the effectiveness of the project. The weaknesses were that those groups with informal structures found it difficult to function as a team, and the time limits imposed by the project limited the learning experience.


Overseeding temperate legumes is one of the most practices to increase the quantity, quality and sustainability of perennial pastures in Southern Brazil. During the years of 2000 and 2001 the response of six temperate legumes (Adesmia latifolia (wild), Lotus corniculatus, L. subbiflorus, L. uliginosus and Trifolium repens cv. Yi and cv. Regal) was evaluated in mixture with tall fescue (Festuca arundinacea). There was a period of 475 days between sowing date and the last cut and six cuts were made; on the autumn-winter/2000 only one cut was made, on the spring-summer, three cuts and on the autumn-winter/2001, two cuts. The intervals between cuts ranged between 43 and 91 days, being reduced in the warm season. During the total assay period, the average of the mixtures yielded 15038 kg/ha of DM; in the warm season 54% of this total was produced, with an average growth rate of 46 kg/ha/day of DM. In the cold season of 2000 and 2001 this rate was of 22 and 24 kg/ha/day of DM. The birdsfoot trefoil and white clover cv. Yi were the most productive legumes; the former was the best in the warm season (3500 kg/ha of DM) and the last participated with 86.3% in the mixture in the autumn-winter/2001, with 2300 kg/ha/day of DM. The mixtures containing these legumes presented the smallest quantity of weeds and produced 13663 and 11,184 kg/ha of DM respectively, being 82% and 71% of these totals composed of legumes, fescue and ryegrass. A. latifolia did not have a good establishment and its contribution was only 0.84% in the first cut. The L. subbiflorus had a good establishment on the first year, but it disappeared from the mixture in the second year. L. uliginosus had a good establishment and persistence producing up to 1400 kg/ha of DM in the autumn/2001.

*Adesmia latifolia* is a forage legume native from Southern Brazil which is outstanding due to stoloniferous growth habit and for forage production during the cool season. The *Lotus corniculatus* (birdsfoot trefoil) is a forage usually utilized as cool season species in subtropical and temperate regions. For both species, however, there is a reduced number of scientific works related to the nodule type and biological nitrogen fixation (BNF). This work had the purpose to analyze such processes in these species and also to compare their morphological development under different nitrogen sources: mineral-N (ammonium nitrate - 5%), symbiotic-N (inoculation) and without nitrogen (control). The experiment was carried out in greenhouse conditions, utilizing Leonard Jars with nutritive solution; the substrate consisted of mixture of sand, vermiculite and charcoal. It was a randomized complete design with four replications. At the end of 65 days the plants were harvested and evaluated for length and volume of roots, number and weight of nodules, dry matter (DM) accumulation and BNF. *A. latifolia* stand out for the character number of nodules (126/jar) and total nodule weight (82.22 mg DM/jar) as compared to birdsfoot trefoil with 82 nodules/jar and 20.25 mg DM/jar. The BNF was more effective in *A. latifolia*, whose inoculated plants produced an average of 37% of DM that was obtained by plants supplied with mineral-N, while birdsfoot reached only 15% of DM production with BNF. The amount of symbiotic fixed nitrogen was 43.12 mg N/jar in Adesmia and 9.92 mg in birdsfoot trefoil.


*Tetragonolobus wiedemannii* = *Lotus wiedemannii* is in fact a synonym of *Hammatolobium*
lotoides.

Several species of Lotus are typified. The species Lotus wrangelianus is moved into the genus Acmispon. The genus Syrmatium (a genus segregated from Lotus) is typified.

The genus is segregated from Lotus and corresponds to Lotus sect. Simpeteria Ottley.

Acmispon is an American genus segregated from Lotus.

Hosackia is a North American genus segregated from Lotus.


The birdsfoot trefoil cv. São Gabriel is an important winter-spring growing legume in the Southern Brazil, which main limitation is the low persistence under grazing. The objective of this work was to evaluate eight populations of this cultivar, selected under grazing or cut, comparing with two rhizomatous genotypes and a cultivar from Uruguay (Agrosan Trueno), with the purpose to evaluate the morphological variability and characters linked to grazing tolerance. Two assays were conducted in the greenhouse with plants grown in pots until the full flowering stage. It was observed morphological variability in the populations, with variation in the leaf, stem and crown morphology as well as in growth habit. Only in the rhizomatous genotypes were observed tipical rhizomes, but all the genotypes showed subterraneous stems. The rhizomatous genotypes were susceptible to mites and two populations showed symptoms of anthracnose. There are some morphophysiological variability of the cv. São Gabriel populations can be used in a birdsfoot trefoil breeding programs.


This work was carried out to characterize agronomically birdsfoot trefoil (Lotus corniculatus L.) genotypes, including eight populations derived from the cultivar São Gabriel, one rhizomatous cultivar (ARS-2620) and one cultivar without rhizomes (Trueno). Individual plants were submitted to seven cuts under field conditions during one year, at Passo Fundo, Rio Grande do Sul, Brazil. There was little variation among the populations in relation to forage yield, quality and persistence. On the average, the populations and the cultivar Trueno were about 50% more productive than the cultivar ARS-2620. The persistence presented a range varying from 80% to 100% of survival. The crude protein content decreased from 21,8 (vegetative) to 11,2% (flowering). The overall mean for fiber insoluble in acid detergent was 24,2% and the fiber insoluble in neutral detergent ranged from 55,3% to 58,8%. Overall, the populations presented a higher yield potential in relation to the cultivar ARS-2620.


The name Vermiflux was included by Polhill (1981) into synonymy of Lotus. We have
demonstrated that this genus should be merged with *Dorycnopsis*.

**TSUTSUPA T.A., BARYKINA R.P., KRAMINA T.E. and SOKOLOFF D.D. 2001.** On the reduction of terminal bud in seedlings of some papilionoid legumes // *Feddes Repert.*, **112**, 459-467. Morphological and anatomical structure of seeds and seedlings of *Securigera securidaca* (L.) Degen & Doerfl. and several other members of *Loteae* tribe [Ornithopus sativus Brot., Lotus tetragonolobus L., Tripodion tetraphyllus (L.) Fourr. and Hymenocarpus circinnatus (L.) Savi] was studied. Development of the plumule, cotyledons, shoots system and main root of the seedlings are described with special attention to the vascular system. In cotyledonary axils, serial buds early appear and develop that makes identification of the main shoot rather difficult. However, the apical bud and normally developed main shoot were found in all examined species. Dormer’s (1945) idea on the reduction of the main bud and Compton’s (1912) supposition on extra-axillary branching of epicotyl into equivalent shoots were disproved.


20-22nd November 1998, University of Aarhus, Denmark.


WOOD F.J. 1997. Comparison of the growth periodicity and population dynamics of *Lotus pedunculatus* (cv Grasslands Maku) and *Lotus corniculatus* (cv Grasslands Goldie) in a summer rainfall environment. Honours dissertation, Department of Crop Sciences, The University of Sydney. **Dr. John Ayres**