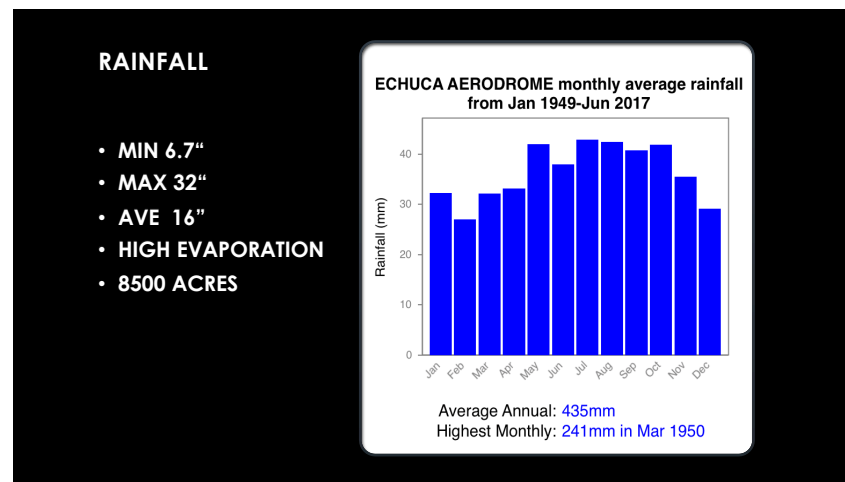
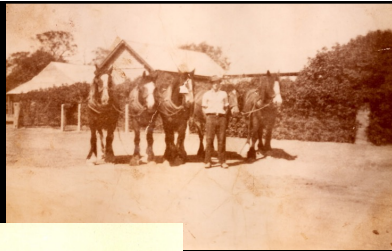




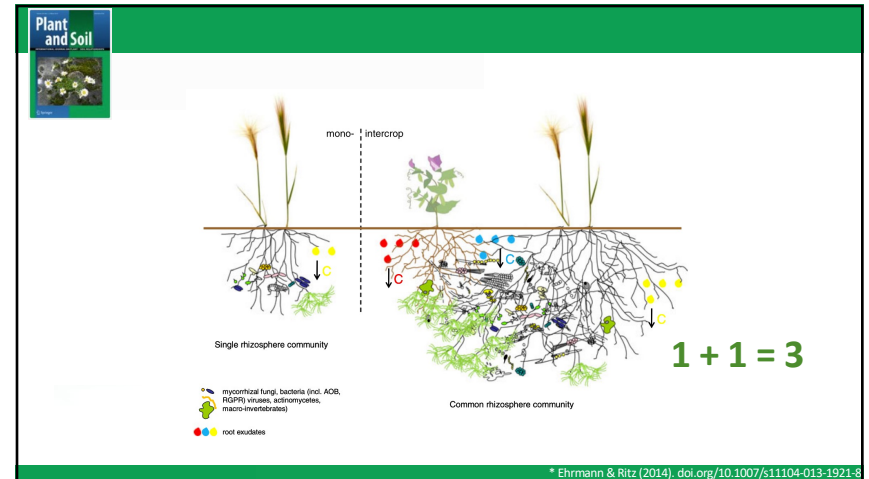
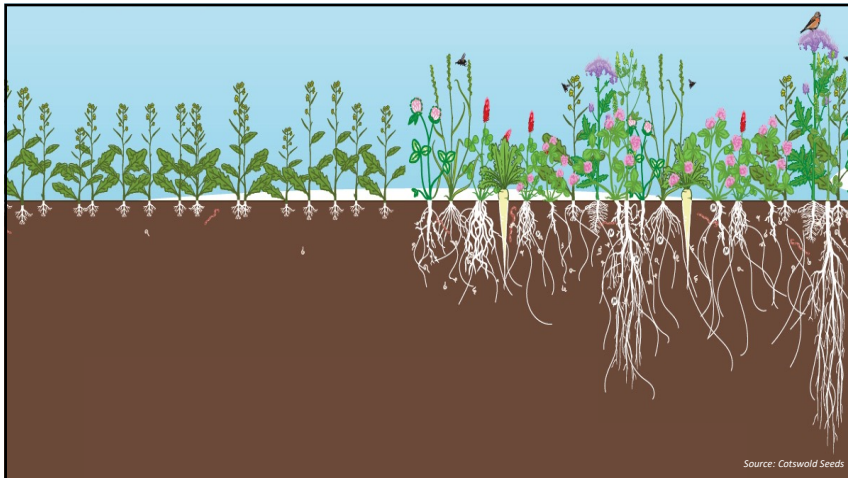
6TH
GENERATION
FARMER





2008

- NO MORE MAP
- SEED DRESSINGS
- FUNGICIDE
- INSECTICIDE
- FOCUS ON ROTATIONS & DIVERSITY
- ZERO TILL
- CTF
- LIVESTOCK INTEGRATION



SCIENTIFIC REPORTS

www.nature.com/scientificreports

Cover crop species have contrasting influence upon soil structural genesis and microbial community phenotype

Aurelie Bacq-Labreuil¹, John Crawford², Sacha J. Mooney¹, Andrew L. Neal² & Karl Ritz¹

Cover crops (plants grown in an agricultural rotation between cash crops) can significantly improve soil quality via sequestering carbon, retaining nutrients, decreasing soil erosion, and maintaining belowground biodiversity. However, little is known about the effects of such plants upon soil structure. The aim of the study was to assess the impact of four species typically used as cover crops and which have contrasting root architecture (viz. clover, black oat, phacelia, tillage radish) on soil structural genesis and the associated modification of microbial community structure in a clay soil. The four plant species were grown in a replicated pot experiment with sieved soil (<2 mm), with unplanted soil as control for 8 weeks. X-ray Computed Tomography was used to quantify the formation of pore networks in 3D and phospholipid fatty acid analysis was performed to characterise the microbial community phenotype. Black oats developed a greater soil-pore connectivity than the other species throughout the growth period, whereas phacelia decreased both the porosity and pore-connectivity. The microbial community phenotype under phacelia was notably different from the other species, with a greater proportion of fungal markers. Thus, different plant species have differential effects upon soil structural genesis and microbial community phenotype, which provides evidence that certain species may be more suitable as cover crops in terms of soil structural conditioning depending upon specific contexts.

* Bacq-Labreuil et al. (2019). doi.org/10.1038/s41598-019-43937-6

Plant and Soil

Crop diversity facilitates soil aggregation in relation to soil microbial community composition driven by intercropping

Abstract
Background and Aims Studies verify that intercropping increases soil macro-aggregates but the mechanism underlying the increase is poorly understood.
Methods Three long-term field experiments were conducted starting in 2009 at three sites in an oasis in north-west China. The first was a split-plot design: *Rhizobium* (with or without inoculation) and three cropping systems (faba bean/maize intercropping and corresponding monocultures). The second and third experiments were both single-factorial randomized block designs with nine cropping systems (maize intercropped with faba bean, chickpea, soybean, or oilseed rape, and the corresponding monocultures). Soil aggregates were determined by the wet sieving method. Microbial biomass and community composition in 2015 and 2016 were determined by phospholipid fatty acid (PLFA) and high throughput sequencing analysis of 16S rRNA.
Results Soil macro-aggregates (> 2 mm) in intercropping systems increased by 15.5–58.6% across three sites and two years, an effect derived partly from increased relative abundance of soil *Sordariales*, from enhanced arbuscular mycorrhizal fungi biomass, or from reduced relative abundance of *Nitrospirae*, depending on soil type.
Conclusions Intercropping alters soil microbial community composition and further facilitates soil aggregation. These findings provide insights into the mechanisms underlying the maintenance of biodiversity in ecosystem functioning.

* Xiu-li (2019). doi.org/10.1007/s11104-018-03924-8

Agriculture Ecosystems & Environment

Cover crop crucifer-legume mixtures provide effective nitrate catch crop and nitrogen green manure ecosystem services

During the fallow period, crucifers grown as catch crops are known to effectively reduce nitrate leaching, while legumes act mainly as green manure by releasing large amounts of mineral nitrogen (N) for the subsequent cash crop once incorporated into the soil. Crucifer-legume cover crop mixtures could be an effective solution for obtaining these two ecosystem services because they combine advantages of both species. However, crucifers might be a poor companion crop due to their high competition for abiotic resources and a potential allelopathic effect on legumes when grown with them. The aim of our study was to assess performances of a wide range of bispecific crucifer-legume mixtures to provide both catch crop and green manure services. A two-year experiment was conducted at two sites (near Toulouse and Orléans, France) where cultivars from eight crucifer species (rape, white mustard, Indian mustard, Ethiopian mustard, turnip, turnip rape, radish and rocket) and nine legume species (Egyptian clover, crimson clover, common vetch, purple vetch, hairy vetch, pea, soya bean, faba bean, and white lupin) were tested in sole-crop and bispecific mixtures (substitutive design of 50%-50% sole crops). We measured cover crop biomass and N acquisition to assess the soil nitrate catch crop service and N green manure service for the subsequent cash crop. In all experiments, compared to bare soil, crucifer-legume mixtures and crucifer sole cover crops provided the same level of nitrate catch crop by reducing soil mineral N by an average of 59%, while legume sole cover crops reduced it by at least 35%, which is significant. In addition, within 6 months after termination, crucifer-legume mixtures mineralised more N (mean of 22 kg N ha⁻¹) and thus had a larger N green manure effect for the subsequent cash crop than crucifer sole cover crops (mean of 8 kg N ha⁻¹). This was due to greater N acquisition and a lower C:N ratio of crucifer-legume mixtures; even though crucifers always had advantage in acquiring N, legumes acquired enough N to provide an effective green manure service. These results were consistent in all of our experiments, which represent a wide range of crucifer-legume cover crops, demonstrating their generality. They also demonstrate the compatibility and complementarity of these species when grown together. In conclusion, combining crucifers and legumes as cover crops is an effective solution for obtaining multi-ecosystem services related to N recycling by providing both nitrate catch crop and N green manure services.

* Couedel et al. (2018). doi.org/10.1016/j.agee.2017.11.017

Biology and Fertilization of Soils

Catch crop diversity increases rhizosphere carbon input and soil microbial biomass

- Mustard (mono) vs 4-way mix or 12-way mix
- CO₂ uptake 2x higher in mix-4 and 3x higher in mix-12
- Total microbial biomass 8% higher in mix-4 and 18% higher in mix-12
- Fungal and actinobacteria most responsive
- C residence time increased with mixture by up to 1.8 times

The results of this study suggest positive impacts of plant diversity on C cycling by higher atmospheric C uptake, higher transport rates towards the rhizosphere, higher microbial incorporation and prolonged residence time in the soil environment.

* Gentsch et al. (2020). doi.org/10.1007/s00374-020-01475-8

ARTICLE

<https://doi.org/10.1038/s41467-019-09258-y> OPEN

Meta-analysis shows positive effects of plant diversity on microbial biomass and respiration

Chen Chen¹, Han Y.H. Chen^{1,2}, Xinli Chen¹ & Zhiqun Huang^{2,3}

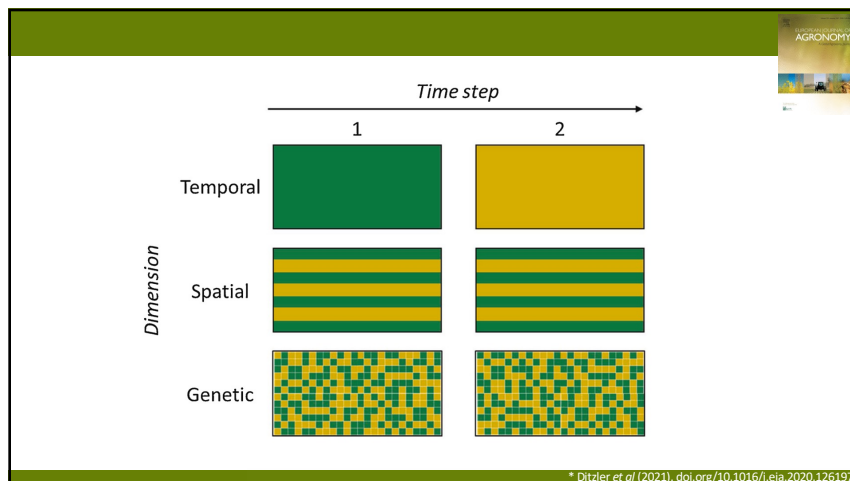
Soil microorganisms are key to biological diversity and many ecosystem processes in terrestrial ecosystems. Despite the current alarming loss of plant diversity, it is unclear how plant species diversity affects soil microorganisms. By conducting a global meta-analysis with paired observations of plant mixtures and monocultures from 106 studies, we show that microbial biomass, bacterial biomass, fungal biomass, fungi:bacteria ratio, and microbial respiration increase, while Gram-positive to Gram-negative bacteria ratio decrease in response to plant mixtures. The increases in microbial biomass and respiration are more pronounced in older and more diverse mixtures. The effects of plant mixtures on all microbial attributes are consistent across ecosystem types including natural forests, planted forests, planted grasslands, croplands, and planted containers. Our study underlines strong relationships between plant diversity and soil microorganisms across global terrestrial ecosystems and suggests the importance of plant diversity in maintaining belowground ecosystem functioning.

Arbuscular mycorrhizal fungi respond to increasing plant diversity

Rhoda L Burrows and , Francis L Pfleger

Canadian Journal of Botany, 2002, 80(2): 120-130, <https://doi.org/10.1139/b01-138>

Abstract: The effect of plant diversity (1, 2, 8, or 16 species) on arbuscular mycorrhizal fungi (AMF) was assessed at the Cedar Creek Long-Term Ecological Research site at East Bethel, Minnesota, from 1997 to 1999. At each of the five samplings, AMF in 16-species plots produced from 30 to 150% more spores and from 40 to 70% greater spore volumes than AMF in one-species plots. Regressions of spore numbers and volumes with percent plant cover, plant diversity, and soil NO₃ as independent variables suggest that midsummer plot soil NO₃ was the best single predictor of AMF spore production in these plots. Plant diversity influenced spore volume in four samplings and spore numbers in the first three samplings. Plant cover was predictive of spore volume throughout the experiment but of spore number only in the first year. Sporulation by larger-spored AMF species (*Gigaspora* spp. and *Scutellospora* spp.) increased significantly with increasing plant diversity, while sporulation of the smaller-spored species varied in response to host diversity. Spore numbers of several AMF species were consistently negatively correlated and none positively correlated with midseason soil NO₃ concentrations, demonstrating the adaptation of these AMF species to nitrogen-limited conditions.



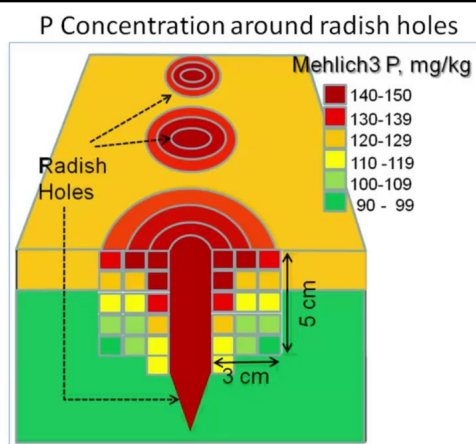




WHEAT, CLOVER & RADISH

BUILDING NUTRITION BY ADDING DIVERSITY

- TRY TO INCLUDE LEGUMES IN EVERY PASTURE OR CEREAL CROP
- LEGUMES LIKE CLOVER TEND TO FEED FUNGI, FIX N & RELEASE ROOT EXCUDATES TO PRY APART THE CA & P BOND IN SOIL
- OATS RELEASE COMPOUNDS THAT INHIBIT PULSE DISEASE ETC.



White and Weil (2009)





Building Mixes

- Start with heavy lifters
- Aim for 4 or more plant families
- 8 or more species
- Be careful of ratios
- What is your soils telling you (weeds)
- What are my goals
- Fix N
- Unlock P and Ca
- Manage disease
- Suppress weeds
- Live weight gains animal health
- Improve soil structure infiltration



PLANT FAMILIES

FARMERS AROUND THE WORLD ARE FINDING THAT OPTIMAL FUNCTIONAL DIVERSITY IN ANNUAL COVERS, FORAGES, CASH CROPS AND PERENNIAL PASTURES REQUIRES A MINIMUM OF FOUR PLANT FAMILIES AND PREFERABLY SIX, WITH ONLY ONE OF THESE FAMILIES BEING THE GRASS FAMILY. PLANT FAMILIES MOST COMMONLY USED IN COMPANION AND COVER CROPS

- **AMARYLLIDACEAE** - ONIONS, CHIVES, GARLIC ETC
- **APIACEAE**: MORE THAN 3,000 SPECIES INCLUDING CARROTS, PARSNIP, CORIANDER, CARAWAY, CUMIN, CELERIAC, CELERY, CORIANDER/CILANTRO, DILL, FENNEL, LOVAGE, ANGELICA, ANISE, CHERVIL, CICELY, PARSLEY AND SO ON APIACEAE ARE ALSO GREAT COMPANIONS FOR FRUIT TREES, AS IS ASPARAGUS (IN THE **ASPARAGACEAE** FAMILY, UNSURPRISINGLY!!)
- **ASTERACEAE**: THE DASIES - LETTUCE, SUNFLOWERS, SAFFLOWERS, MARIGOLDS, ZINNIA'S ETC
- **BORAGINACEAE**: PHACELIA, BORAGE, COMFREY
- **BRASSICACEAE**: RADISH, TURNIP, KALE, CAMELINA, MUSTARD, SWEET ALYSSUM ETC
- **CHENOPODIOIDEAE**: (A SUB-FAMILY OF AMARANTHACEAE) ALL THE BEETS, PLUS QUINOA
- **CUCURBITACEAE**: CUCUMBERS, GOURDS, MELONS, SQUASHES, ZUCCHINIS AND PUMPKINS
- **FABACEAE**: MOST OF THE COOL AND WARM-SEASON LEGUMES ARE IN THIS FAMILY - CLOVERS, PEAS, BEANS, BIRDFOOT TREFOL, VETCHES, ALFALFA, SUNN HEMP, SANFOIN, SULLA, FENUGREEK ETC.

PLANT FAMILIES (CONT.)

- **LAMIACEAE** - MINTS, BASIL, SAGE, THYME
- **LINACEAE**: LINSEED (FLAX) - WIDELY USED IN COVERS AND ALSO AN EXCELLENT NON-COMPETITIVE COMPANION IN THE VEGETABLE GARDEN
- **MALVACEAE**: OKRA
- **POACEAE**: COOL-SEASON CEREALS (EG WHEAT, OATS, BARLEY, RYE ETC) AND WARM-SEASON GRASSES (CORN, SORGHUM, MILLET ETC)
- **POLYGONACEAE**: BUCKWHEAT,

IN ADDITION TO THE WIDE DIVERSITY OF ANNUAL AND PERENNIAL PLANTS LISTED ABOVE, AN INCREASING NUMBER OF LIVESTOCK PRODUCERS ARE INCLUDING THE FOLLOWING NON-LEGUMINOUS PERENNIAL FORBS IN THEIR PASTURES

- **APIACEAE**: SHEEP'S PARSLEY (*PETROSELINUM SATIVUM*)
- **ROSACEAE**: SALAD BURNET [ALSO KNOWN AS SMALL OR SHEEP'S BURNET] (*SANGUISORBA MINOR*)
- **ASTERACEAE**: CHICORY (*CICHORIUM INTYBUS*), YARROW (*ACHILLEA MILLEFOLIUM*)
- **ONAGRACEAE**: EVENING PRIMROSE (*OENOTHERA GLAZIOVIANA*)
- **PLANTAGINACEAE**: NARROW-LEAVED PLANTAIN (*PLANTAGO LANCEOLATA*)



Livestock Integration

Grazing enhances belowground carbon allocation, microbial biomass, and soil carbon in a subtropical grassland

Abstract

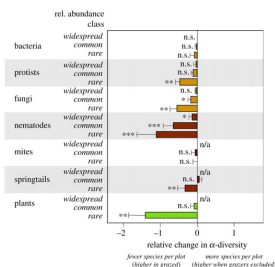
Despite the large contribution of rangeland and pasture to global soil organic carbon (SOC) stocks, there is considerable uncertainty about the impact of large herbivore grazing on SOC, especially for understudied subtropical grasslands. It is well known that root system inputs are the source of most grassland SOC, but the impact of grazing on partitioning of carbon allocation to root tissue production compared to fine root exudation is unclear. Given that different forms of root C have differing implications for SOC synthesis and decomposition, this represents a significant gap in knowledge. Root exudates should contribute to SOC primarily after microbial assimilation, and thus promote microbial contributions to SOC based on stabilization of microbial necromass, whereas root litter deposition contributes directly as plant-derived SOC following microbial decomposition. Here, we used in situ isotope pulse-chase methodology paired with plant and soil sampling to link plant carbon allocation patterns with SOC pools in replicated long-term grazing

Grazing *exclusion* was associated with:

- less belowground C allocation
- less root biomass
- less root exudation
- less microbial biomass
- lower soil organic carbon

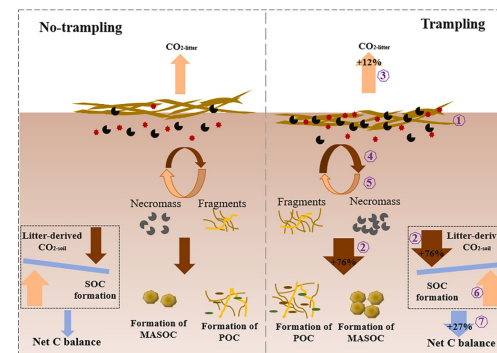
* Wilson *et al* (2018). doi.org/10.1111/gcb.14070

Cessation of grazing causes biodiversity loss and homogenization of soil food webs



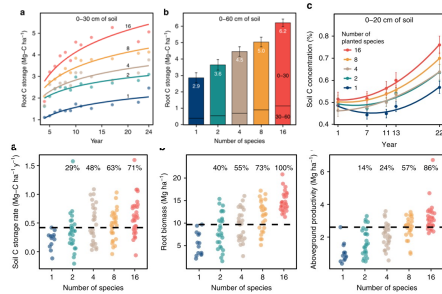
There is widespread concern that cessation of grazing in historically grazed ecosystems is causing biotic homogenization and biodiversity loss. We used 12 montane grassland sites along an 800 km north-south gradient across the UK, to test whether cessation of grazing affects local α - and β -diversity of below-ground food webs. We show cessation of grazing leads to strongly decreased α -diversity of most groups of soil microbes and fauna, particularly of relatively rare taxa. By contrast, the β -diversity varied between groups of soil organisms. While most soil microbial communities exhibited increased homogenization after cessation of grazing, we observed decreased homogenization for soil fauna after cessation of grazing. Overall, our results indicate that exclusion of domesticated herbivores from historically grazed montane grasslands has far-ranging negative consequences for diversity of below-ground food webs. This underscores the importance of grazers for maintaining the diversity of below-ground communities, which play a central role in ecosystem functioning.

* Schrama *et al* (2023). doi.org/10.1098/rspb.2023.1345



* Wei *et al* (2020). doi.org/10.1016/j.geoderma.2020.114828

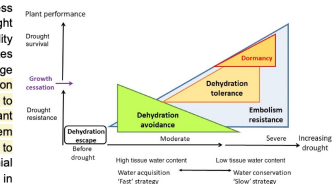
Soil carbon sequestration accelerated by restoration of grassland biodiversity



* Yang et al (2019). doi.org/10.1038/s41467-019-08635-w

Using plant diversity to reduce vulnerability and increase drought resilience of permanent and sown productive grasslands

Climate change associated with a greater variability of inter- and intra-annual droughts and the occurrence of extreme events act in combination to challenge semi-natural and sown productive grasslands in Europe. Successful plant strategies under drought strongly depend on stress intensity. Drought resistance to maintain leaf growth under moderate stress trades off with drought survival after growth cessation under life-threatening drought. Substantial intra-specific variability exists in key forage grasses originating from the Mediterranean to the cool-temperate climates and represents a great potential for adaptation of future ecotypes and cultivars to a larger range of drought intensities. Plant species diversity offers an opportunity to stabilize forage production in two ways. First, growth reduction under stress is significantly smaller for diverse compared to simple plant communities because the former offers the opportunity to include drought-resistant (or drought-surviving) species. Second, positive interactions among species increase ecosystem functioning of more diverse plant communities under moderate drought, allowing them to compensate for drought-induced yield reductions. Currently, available cultivars of perennial forage species adapted to dry climate are still rare and only a few forage species are used in productive systems. Thus, both intra- and inter-specific plant diversity should be better valued to reduce vulnerability and increase resilience of productive grasslands.



* Lüscher et al (2022). doi.org/10.1111/gfs.12578

Regenerative rangeland management improves honey bee health and productivity



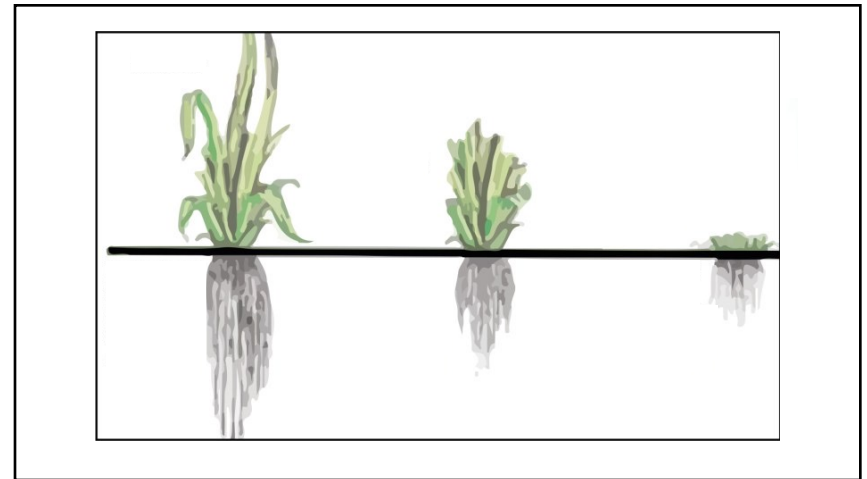
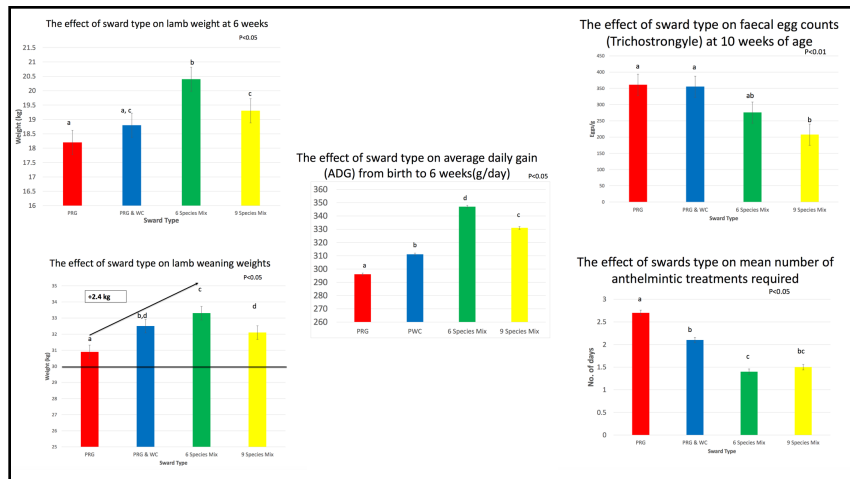
Rangelands support managed and endemic pollinator communities, but the way that cattle are managed in these habitats affects floral resources and habitat suitability. We placed honey bee colonies on continuously and regeneratively grazed rangelands. Regeneratively grazed rangelands had relatively higher stocking rates, animals were moved into new paddocks more frequently, and the rangeland was allowed to rest after grazing for longer than continuously grazed areas. Rangeland plant community characteristics measured monthly during the growing season included forage biomass, flowering species richness, and abundance of flowers. Monthly measurements of colony weight gain, brood production, and Varroa mite abundance were recorded. Regeneratively managed rangelands had more flowering species and greater flower abundance, and floral species richness was correlated with colony weight gain. Specifically, minimum floral species richness (indicative of periods of resource scarcity) were more influential to hive weight gain than periods of greater floral richness. Plant biomass was positively associated with brood production, and negatively associated with Varroa incidence. Rangeland pasture management was associated with the abundance and composition of the flowering plant communities, which in turn were associated with the health and productivity of honey bee colonies stationed at these sites. Our results suggest that regeneratively managed rangelands offer a tool for conserving and promoting honey bees in this region.

* Busenitz et al (2025). doi.org/10.3389/fsufs.2025.1555238

Grazing mixtures

- **PRG:** PRG only @ 163kg N/ha/yr
- **PRG & WC:** PRG & white clover @ 90kg N/ha/yr
- **6 Species mix:** 6 species @ 90kg N/ha/yr
(PRG, Timothy, White Clover, Red Clover, Plantain, Chicory)
- **9 Species mix:** 9 species @ 90kg N/ha/yr
(PRG, Timothy, Cocksfoot, White Clover, Red Clover, Birdsfoot Trefoil, Plantain, Chicory, Yarrow)





LIVESTOCK INTEGRATION

TONNE/HA
VS
KG/HA

CONTROL TRAFFIC CATTLE FARMING (CTCF)



CONTROL TRAFFIC CATTLE FARMING (CTCF)

GRAZING MANAGEMENT IN CROPPING PADDOCKS

SET STOCKING VS HIGH DENSITY GRAZING TRIALS MEASURING

- BIOMASS PRODUCTION
- RECOVERY AFTER GRAZING
- SOIL CARBON & FERTILITY LEVEL
- SOIL COMPACTION
- LIVE WEIGHT GAINS
- BACTERIAL TO FUNGAL RATIO
- SOIL BIOLOGY



CENTRAL NSW



WINTER SUPER MIX



SUMMER SUPER MIX






**INTERGRATING COVER CROPS
IN CROPPING TO HELP WITH**

- BUILDING FERTILITY
- SOIL CARBON LEVELS
- BREAKING WEED CYCLES WITHOUT CHEMICALS TO HELP MINIMIZE RESISTANCE AND REDUCE CHEMICAL INPUTS \$
- WATER INFILTRATION
- INCREASE SOIL BIOLOGY AND SOIL IMMUNITY = LESS DISEASE AND PESTS, SLUGS, MICE ETC & MORE BENEFICIAL INSECTS

- 2-3 X AVE LIVE WEIGHT GAINS WHILE IMPROVING THE SOIL HEALTH & ANIMAL HEALTH
- MAKING MONEY AT LOW COST BUILDING SOIL RATHER THAN SPENDING MONEY TO FIX SOIL
- TURNING WORST CROPPING PADDOCKS INTO HIGH PRODUCTION WITH MULTI SPECIES & LIVESTOCK INTEGRATION
- MARKETING OPPORTUNITIES FOR PREMIUMS





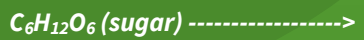

Nutrition Management



Photosynthesis

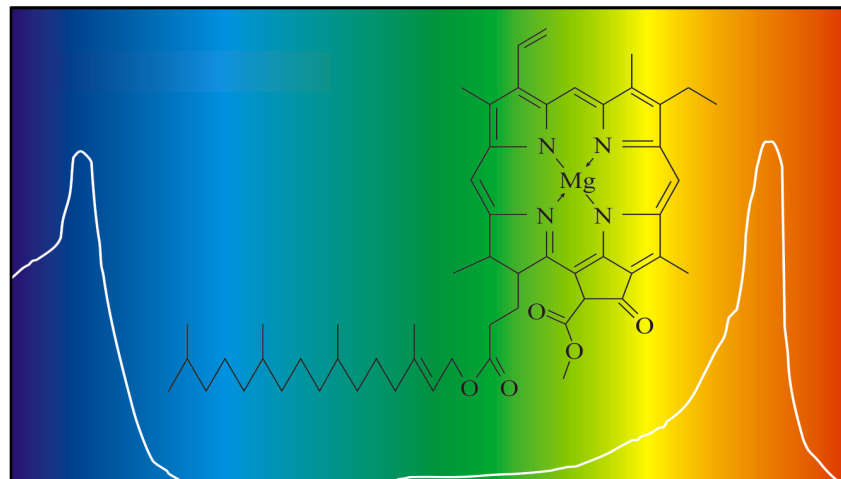


nutrients/enzymes



nutrients/enzymes

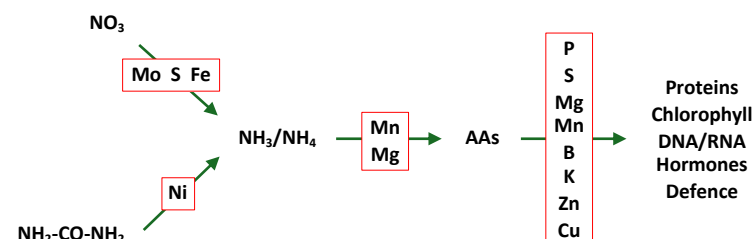
- Complex sugars
- Carbohydrates
- Amino Acids, Proteins
- Fats, Oils, Lipids, Waxes
- Hormones, Vitamins
- Aromatic/volatile compounds
- Defense Chemicals
- Protective Compounds
- Root Exudates



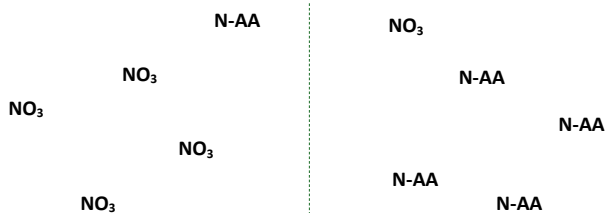
Key Functions of Essential Nutrients

- *N* – Chlorophyll, AA, P
- *P* – Energy, root development
- *K* – Enzyme production, sugar movement, N utilisation
- *Ca* – Cell wall strength
- *Mg* – Chlorophyll
- *S* – N utilisation, root development
- *Si* – cell wall strength
- *B* – sugar translocation, reproductive processes
- *Cu* – disease protection
- *Zn* – auxin production, leaf size
- *Mn* – reproductive processes
- *Fe* – chlorophyll production
- *Mo* – N utilisation
- *Co* – N fixation
- *Ni* – urease enzyme

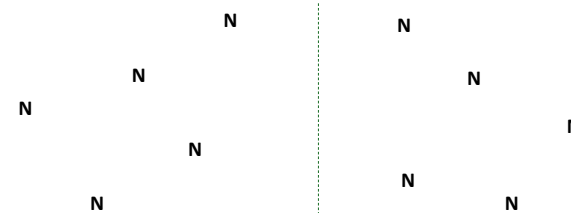
N Metabolism

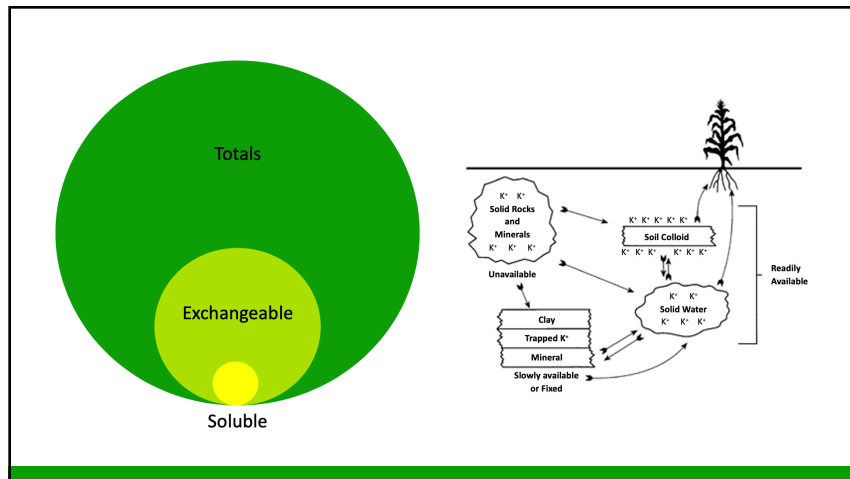


Measuring Total N



Measuring Total N





SEED INOCULANTS

- VERMICAST & EXTRACTS
- ZINC & MANGANESE
- KELP
- TRICHODERMA
- PEUSDOMONAS
- BASCILLIS
- GRDC TRIALS

(TREATED WHEAT VS UNTREATED)





29 Oct 2026

200kg Urea



29 Oct 2026

30kg Urea



Priming Seed

- Match flow rate of auger tonnes per minute with liters per minute
- 5-10Lts/T
- Should just stick to your hand not too wet.
- Will heap up more in truck grouper
- Let it sit for 1-2hrs to dry before calibrating
- Re check calibration half way through first bin.



DISSOLVING UREA

- 7T/28000L
- 1:4 RATIO 15KG/60L
- SINGLE MOST EFFICIENT WAY TO APPLY N TO A PLANT
- ALWAYS COMBINE WITH C SOURCE TO BUFFER & MAGNIFY (M+M+C)
- APPLYING ANY DEFICIENT MINERALS WITH BIOLOGY WILL LIFT BRIX



FOLIAR FERTILISER TIPS

- Agitation
- Run through filters filling into boom or nurse truck
- Filters 50 mesh suction and pressure self cleaning
- #3 nozzles easiest or bigger
- Total water volume 80 lts/ha min ideally 100lts/ha
- Mixing, Water first to 50% then Urea, Nutrition (Chemical check compatibility first) Biology last.
- Jar test if unsure first at same ratios
- Watch ph this is why water first to buffer sometimes need to put water through lines in between ferts if big ph differences
- Stick to delta T for spray times. In winter ok most of the day in summer avoid heat and too much sun on biology



LIQUID INJECT LINE





BRIX

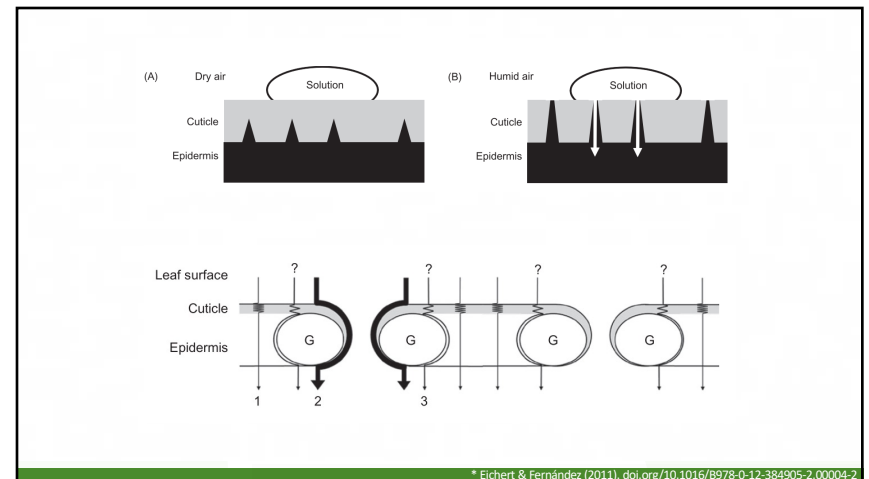
- OPTIMAL PHOTOSYNTHESIS & PLANT HEALTH OCCUR WHEN BRIX IS OVER 12 = LESS PESTS, DISEASE & WEEDS, GREATER CARBON SEQUESTRATION & LIVE WEIGHT GAINS
- 1% LIFT IN BRIX INCREASES 45G/DAY WEIGHT GAIN IN ANIMALS & 100G/MILK SOLIDS/COW/DAY
- HIGHER SUGARS REDUCES IMPACT OF FROST



Foliars Enhance Soil Uptake?

- Foliar NH_4^+ increased soil N uptake (cotton)
- Foliar K promoted soil K uptake (potato)
- Foliar urea enhanced soil N and P uptake (potato)
- Mechanism?
 - Foliar nutrients can be translocated to roots and increase root biomass and hence soil uptake.
 - Enhanced root exudation.

* Niu et al (2021). doi.org/10.1007/s42729-020-00346-3



Plant response depends on...



Formulation



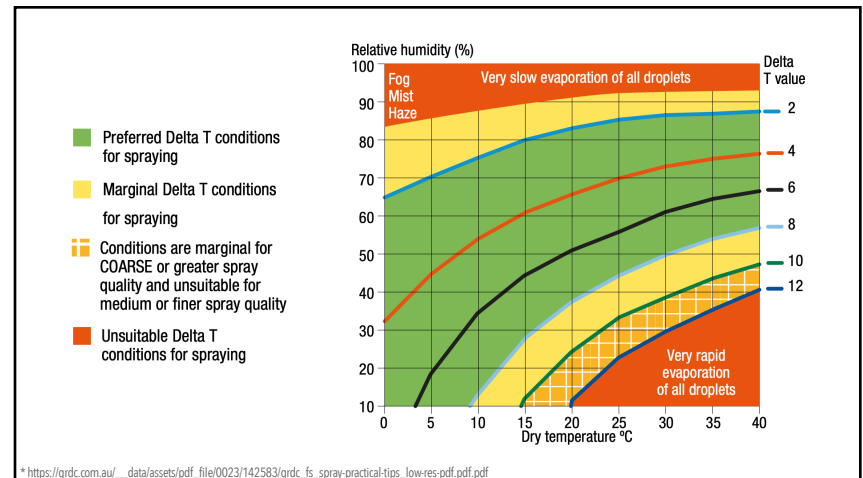
Crop



Application



Environment



Foliar Nitrogen



The live lectures for Foliar Nitrogen have ended, the recordings are available to purchase as an on demand course.

Access to Foliar Nitrogen includes:

- Permanent access to the 10 lecture online course (detailed outline below)
- Factsheets and articles summarising key take home learnings from the course
- Case studies of farmers around the world implementing foliar nitrogen strategies
- Further reading - a compiled reading list of lay articles and academic papers relevant to and referenced in the course
- A pdf of powerpoint slides

* www.integratedsoils.com/foliar-nitrogen

SOIL HEALTH



x.com/grant_sims

[instagram.com/stillgotyoucovered](https://www.instagram.com/stillgotyoucovered)

[facebook.com/downunderag](https://www.facebook.com/downunderag)



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[facebook.com/integratedsoils](https://www.facebook.com/integratedsoils)