an effective way of improving economic output and is environmentally friendly to the whole society.

Keywords: light use efficiency; border row effect; water equivalent ratio; inter-specific competition; leaf photosynthesis

PS-6.2-03

Nitrogen Dynamics in Wheat-Pea Intercrops

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Abstract: Intercrops are mainly grown in traditional agricultural systems, but there is an increasing interest especially in cereal–legume intercrops in arable farming systems in temperate regions for increasing productivity and sustainability.

A field experiment was conducted in 2010/2011 and in 2012/13 at the Experimental Farm of BOKU University in Raasdorf which is located to the east of Vienna (Austria). The soil is a silty loam classified as Chernozem. Average long-term precipitation and temperature are 538 mm and 10.6°C. Pure stands of wheat (Triticum aestivum L. cv. 'Xenos') and pea (Pisum sativum L. cv. 'Cherokee') were established with 300 (wheat) and 80 (pea) viable seeds per square meter. Both are facultative winter/spring cultivars. Four intercropping mixtures were sown in replacement series consisting of following wheat:pea ratios (%): 75:25, 50:50, 25:75 and 12.5:87.5. Sowing was performed in autumn and in spring. Harvest was in July. Mineral nitrogen in the soil (up to a soil depth of 90 cm) and nitrogen in the above-ground biomass have been sampled regularly throughout the vegetation period.

Wheat was the dominant partner in the intercrops. With decreasing share in the intercrops, wheat yield decreased slightly whereas the pea grain yield decreased rapidly. All intercrops had a grain yield advantage over corresponding pure stands ranging from 12–20%.

The highest grain yield increase was found in the intercrop with 12.5% wheat and 87.5% pea. The nitrogen concentration of both crops was generally higher during the vegetation period for spring-sown then for autumn-sown crop stands. The nitrogen concentration of wheat increased with a decreased share in the intercrops. The same observations have been made for pea for most sampling dates in the first experimental year whereas nitrogen concentrations of pea where partly lower with a lower share of pea in the mixing ratios at same sampling dates in the second experimental year.

The nitrogen yield in the above-ground biomass was higher for both crops in there pure stands, but for wheat a higher nitrogen yield could also be obtained in intercrops (due to a high biomass production compared to the sowing ratios and higher nitrogen concentrations in intercrops than in the pure wheat stand).

The soil mineral nitrogen concentrations were higher in spring-sowing intercrops than in autumn-sown crop stand during the vegetation period with no difference at harvest. Among crop stand, soil mineral nitrogen was highest in the pea pure stand and lowest in the wheat pure. Intercrops showed throughout the vegetation period and at harvest values between the two pure crops stands (with higher values with a higher pea share in the intercrops). This indicates that intercrops might be a better pre-crop (taking also into account the N-rich legume residues) than wheat pure stands.

Keywords: Intercropping, wheat, pea, nitrogen

PS-6.2-04

Service Crops Root Traits Explain Soil Structural Stability in Mediterranean Vineyards

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Abstract: In Mediterranean region, the climate is known for its heavy storms during spring and autumn, reaching high levels of rainfall intensity. Viticulture is one of the most erosion-prone land uses as the soils often present poor organic carbon levels, and tillage may be frequent to avoid competition between weeds and grapevines (Salomé et al., 2016). Moreover, this crop is often located on steep slopes, shallow soils, where rainfall generates runoff and soil losses. Numerous studies have shown that cover cropping is a relevant solution to limit runoff and increase soil aggregate stability and thus limit soil erosion (Garcia et al., 2018). The role of root traits to increase aggregate stability has been studied in grasslands or natural ecosystems, but few studies have explored the impact of plant traits in tilled agrosystems (Le Bissonnais et al., 2017). The aim of this study was to assess the respective role of root traits and soil characteristics in driving soil aggregate stability in Mediterranean vineyards.

The experiment was carried out from 2016 to 2017 during one growing season, on a vineyard located in the South of France. Treatments consisted in 13 different service crop species and spontaneous vegetation in the inter-rows. Sown species were chosen to have a diversity of botanical families, life cycles, and growing behavior. Service crops were sown on plots of 30m length upon one row and the two adjacent inter-rows, under three contrasted soil management strategies since 2012: permanent vegetation, permanent tillage, and permanent vegetation tilled at n-1. At budburst, aboveground biomass was recorded in quadrats displayed in each treatment (38 quadrats in total). After biomass collection, two soil cores per quadrat were collected to measure root traits, inorganic nitrogen (N) content, soil organic carbon (SOC) and microbial biomass (MB). In each quadrat, soil sample in the 0-10 cm layer was collected to measure aggregates stability (3 repetitions per quadrat) and calculate mean weight diameter (MWD) of aggregates (Le Bissonnais, 1996).

MWD values ranged from 0.31 mm (very unstable) to 1.19 mm (medium stable). Soil structural stability depended on previous soil management, and tillage strongly affected structural stability even after permanent vegetation and high SOC content. Overall, soil components and root traits equally contributed to soil structural stability. Root mean diameter and root mass density were positively correlated with MWD values, specific root length was negatively correlated with MWD values. Moreover, MWD values were higher under legumes species compared to graminoids species. These results suggest that in heavy-disturbed ecosystems such as tilled vineyards, root traits are major factors explaining aggregates stability. Moreover, legumes species seemed more effective to increase aggregate stability. This could help vinegrowers for the choice of suited service crops to improve soil stability and resistance to erosion in vineyards.

Keywords: Service crops, Ecosystem services, Root traits, Aggregate stability, Erosion, Vineyard

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