

Effect of seeding rate on the yield of legume-cereal bi-crops in rainfed production systems of Afghanistan

Serkan Ates^{1,2}, Mounir Louhaichi² Sawsan Hassan², Harun Cicek^{2,3}, Shinan Kassam^{2,4}, Soofizada

Qudratullah⁵, Abdul Haq Farhang⁶, Hayatullah Esmati⁶

¹ Department of Animal and Rangeland Sciences, Oregon State University, Corvallis 97333, USA

² International Centre for Agricultural Research in the Dry Areas (ICARDA), 11195, Amman, Jordan

³ Research Institute of Organic Agriculture (FIBL), Switzerland

⁴ Caritas, Tajikistan

⁵ Agriculture Adaptive Research (ARIA), MAIL, Badam Bagh, Kabul – Afghanistan

⁶ ICARDA, Afghanistan

Email: m.louhaichi@cgiar.org

A two-year study (2016-2017) investigated the effect of seeding rate on forage production of monocultures and binary mixtures of barley (*Hordeum vulgare*), triticale (X Triticosecale Wittmack), lathyrus (*Lathyrus sativus*), common vetch (*Vicia sativa*) and Hungarian vetch (*Vicia pannonica*) that were established at either 100, 200 or 300 plants/m² in rainfed conditions in Mazar-i Sharif, Afghanistan. Averaged across the years, forage production of forage monocultures and mixtures was 3313, 3628 and 3975 kg DM ha⁻¹ for sowing at 100, 200 and 300 plant per m², respectively. Dry matter (DM) production was comparable for sowing at 100 and 200 plants per m². DM yields for sowing at 200 and 300 plant were not significantly different either but sowing at 300 plant per m² resulted in greater ($P < 0.01$) DM yield than sowing at 100 plant per m² indicating that there is no need for applying the seed rates that would provide over 200 plant/m². Average across the year and the sowing rates, barley gave the highest ($P < 0.05$) DM production (4530 kg DM ha⁻¹). The dry matter production of its mixtures with lathyrus also exceeded 4000 kg DM ha⁻¹. These were greater than the yields obtained from triticale (3400 kg DM ha⁻¹) and its combination with the legumes. Lathyrus (3574 kg DM ha⁻¹) and common vetch (3410 kg DM ha⁻¹) had greater DM yields than Hungarian vetch (2536 kg DM ha⁻¹). Overall, barley and its mixtures with the forage legumes provided satisfactory dry matter yield while the performance of triticale and Hungarian vetch was poorer under the rainfed conditions of Mazar-i Sharif. Hungarian vetch is a forage species that has a higher cold tolerance as compared to common vetch and therefore may perhaps be better suited to colder regions with higher altitudes.

Keywords: annual forages, *barley*, dryland farming, *Lathyrus*, triticale, *Vicia*