Abstract

A field experiment was conducted to determine the seasonal patterns of arbuscular mycorrhiza (AM) in a dryland winter wheat (Triticum aestivum L.) system and to determine wheat growth and P uptake responses to inoculation with mycorrhizal fungus. (Broadcast-incorporated treatments included (1) no inoculation with mycorrhizal fungus, with and without P fertilizer, and (2) mycorrhizal fungal inoculation at a rate of 5000 spores of Glomus intraradices (Schenck and Smith), per 30 cm in each row, with and without fertilizer P. Winter wheat was seeded within a day after treatments were imposed, and roots were sampled at 5 growth stages to quantify AM. Shoot samples were also taken for determination of dry matter, grain yield and yield components, and N and P uptake. No AM infection was evident during the fall months following seeding, which was characterized by low soil temperature, while during the spring, the AM increased gradually. Increases in wheat grain yields by enhanced AM were of similar magnitude to the response obtained from P fertilization. However, responses differed at intermediate growth stages. At the tillering stage, P uptake was mainly increased by P fertilization but not by fungal inoculation. At harvest, enhanced AM increased P uptake regardless of whether or not fertilizer P was added. The AM symbiosis increased with rising soil temperatures in the spring, in time to enhance late-season P accumulation and grain production.

Key words Winter wheat · Mycorrhiza · Phosphorus · Dryland