Arbuscular mycorrhizal fungi benefit switchgrass growth and root architecture under extreme drought

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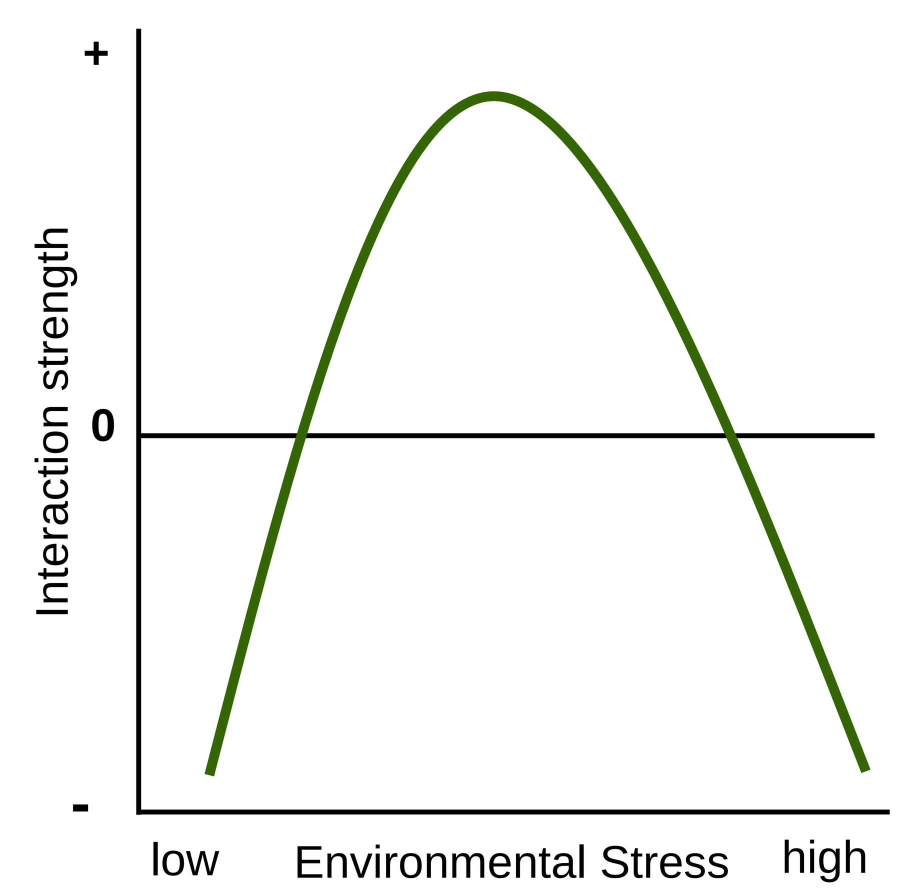
Introduction

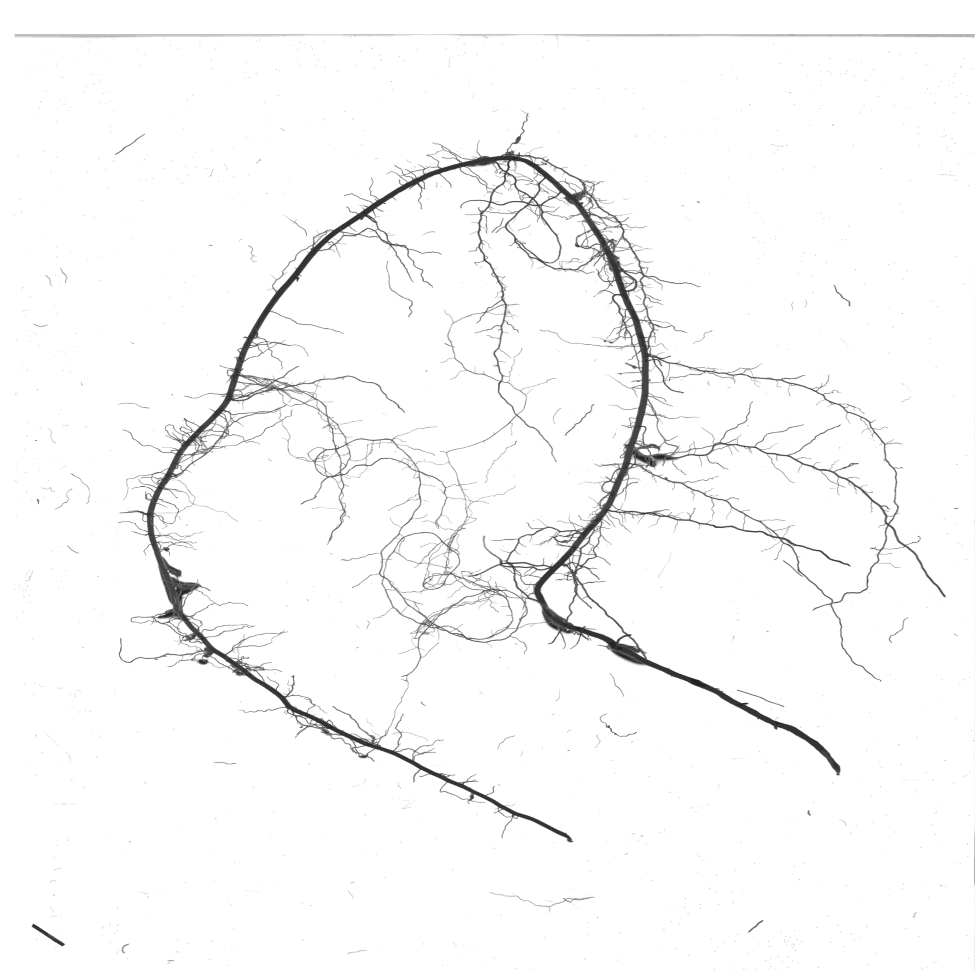
The functioning of plant-mycorrhizal fungal symbioses is dictated by a host of biotic and abiotic factors acting at rhizosphere, community and ecosystem levels. These symbioses can span a gradient from mutualism to parasitism. In this study, we investigated the effects of arbuscular mycorrhizal fungi (AMF) on a biofuel crop *Panicum virgatum (*switchgrass) along a drought intensity gradient. We predicted that AMF would provide maximum growth benefit to the plant under intermediate moisture stress and minimum benefit under extreme moisture stresses.



Kawai and Takeshi 2007

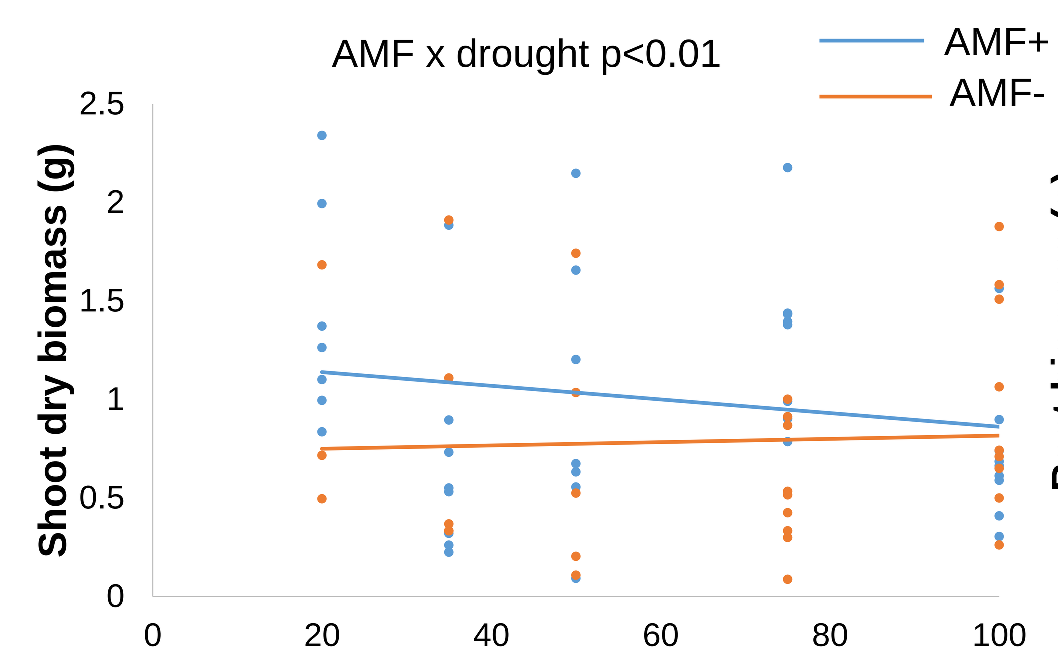
Methods

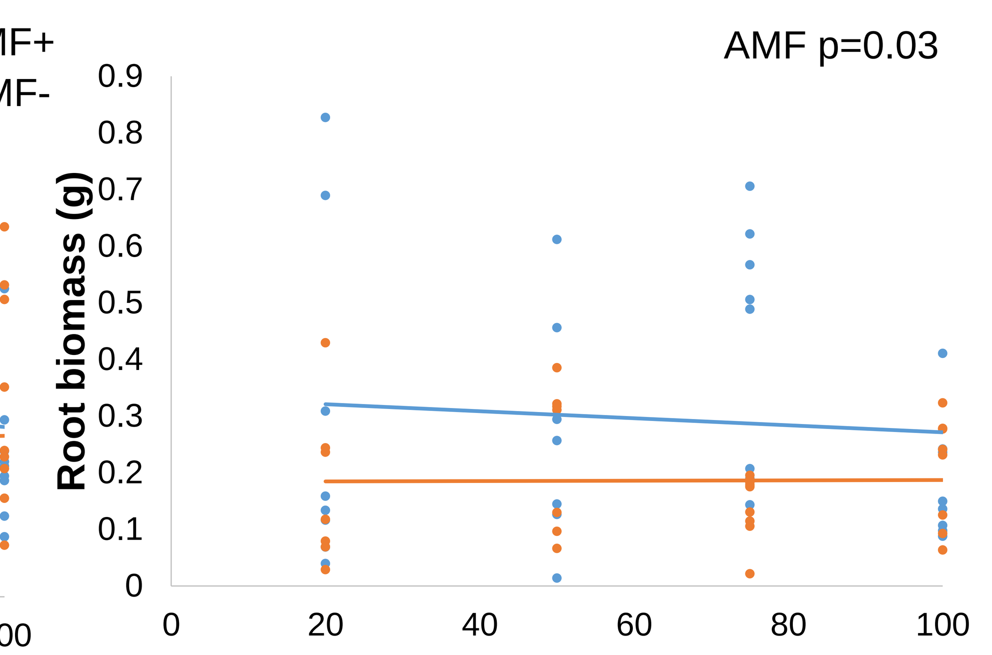
- 90 pots with/without *Claroideoglomus etunicatum* in growth chamber
- Drought treatments based on water holding capacity (Pot capacity, PC): 100% PC, 75% PC, 50% PC, 35% PC and 20% PC (near permanent wilting point)
- Plants grown for 75 days
- Biomass, root architecture, root colonization, soil moisture recorded

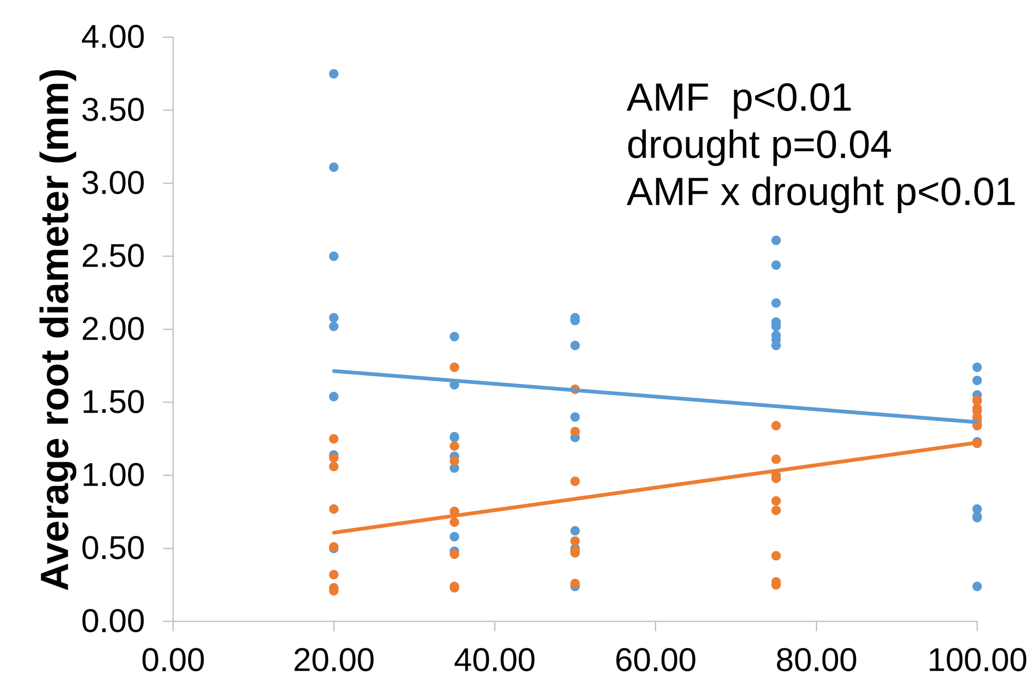


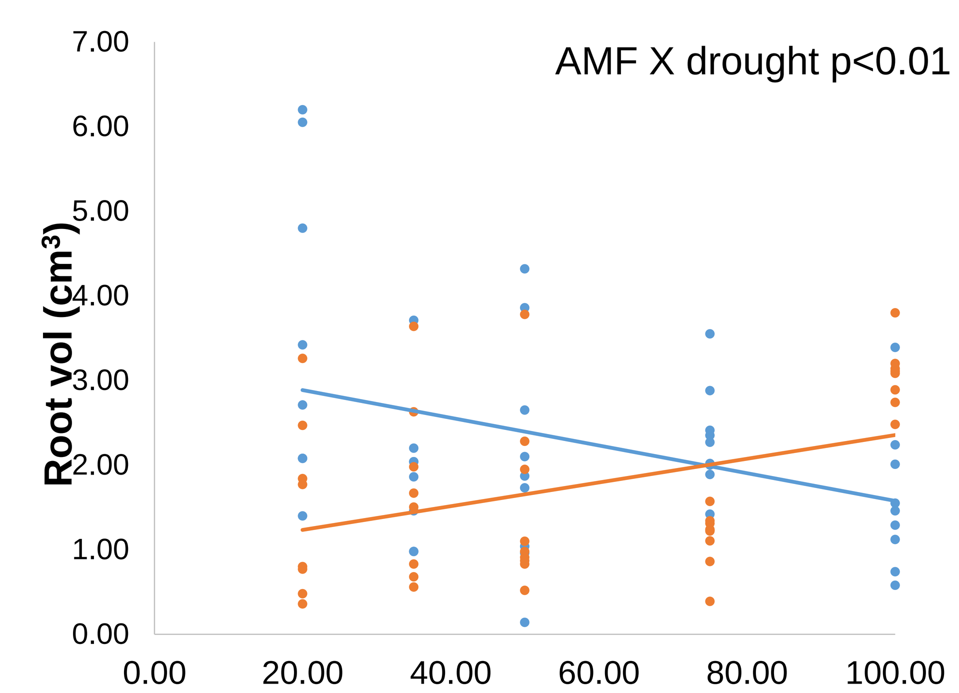
Results

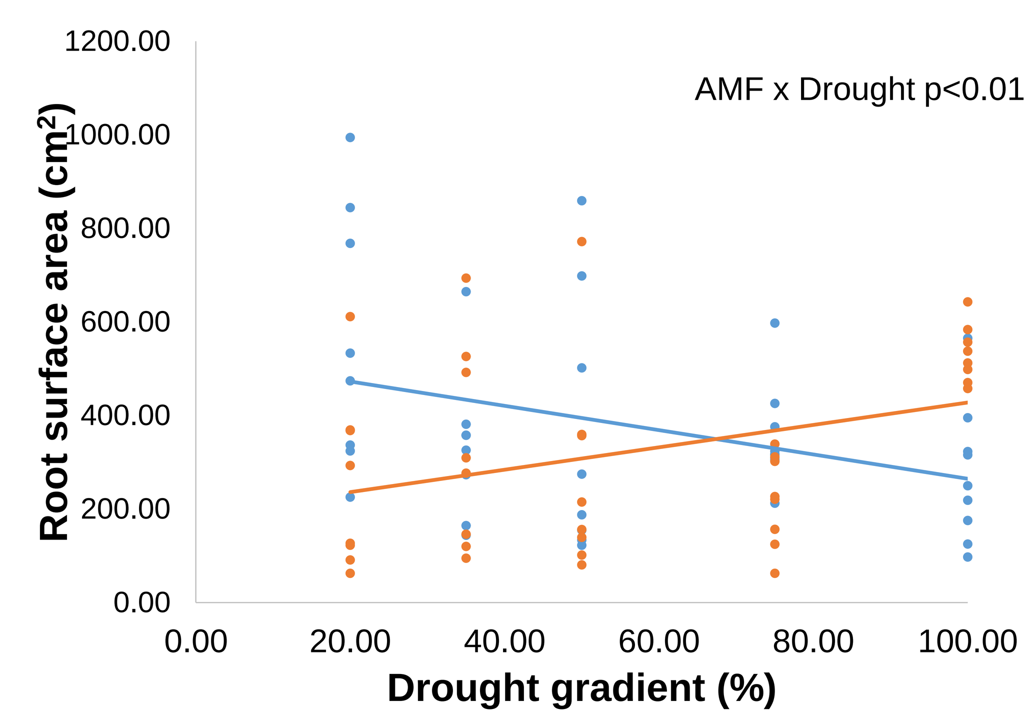
- AMF increased biomass, especially in dry conditions
- AMF effects on root architecture depended on drought: more beneficial under dry conditions

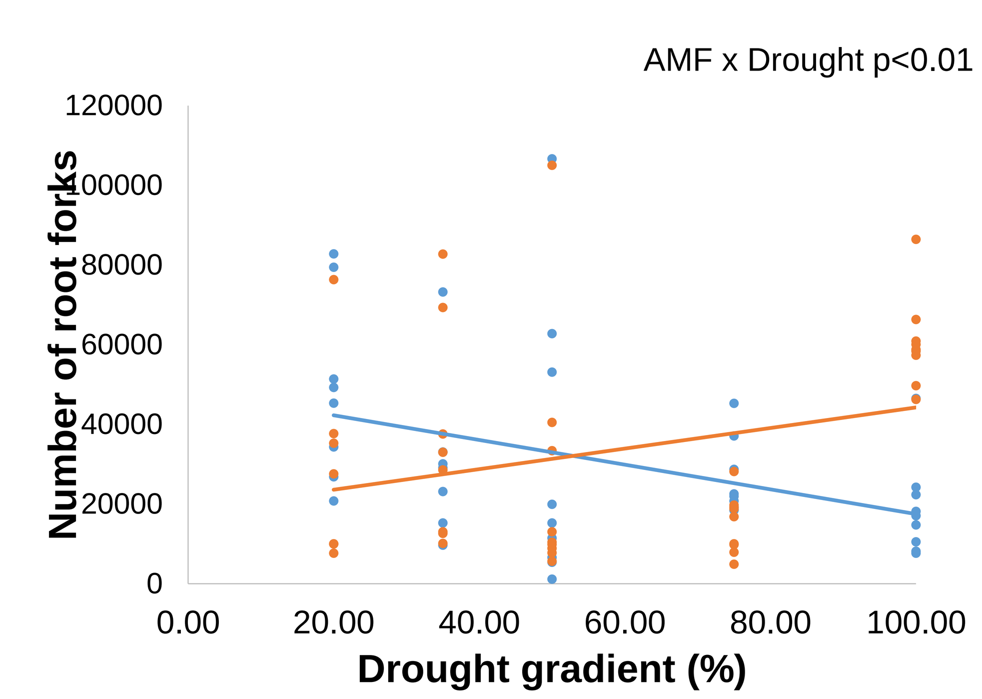












Conclusion

Contrary to our hypothesis, plant benefits from AMF were highest near the permanent wilting point and continued to decline linearly with increasing soil moisture. We are currently analyzing cell wall chemistry of switchgrass to see if it responds similarly.

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