

Dry As A Brome: Distinguishing Between Three Types of Dry Prairies in Northeastern Illinois Through Species Composition



Introduction

Illinois is known as the prairie state but most of the prairies that covered the vast majority of the state have disappeared. One of the major types of these prairies were the dry prairies, which are broken up into three many varieties of Dolomite, Gravel Hills, and Sand Prairies. The few remnants that remain in Illinois of these prairies are only fragments of the original and in many cases are threatened habitat. The goal of this project was to identify key species that characterize these three kinds of dry prairie ecosystems found in northeastern Illinois. In order to make this characterization plant surveys were taken at 18 field locations each identified as one of these three site types as well as measuring the infiltration rate.

Hypothesis

- Dry prairie types will be differentiated by species composition
- The abundance of vegetation at a site will not be affected by infiltration

Results

- ❖ Site types showed separation from each other in the ordination.
- ❖ Some species were most closely linked to each site by their clustering around those site types. There were several other species clustered between all three sites. (Figure 3)
- ❖ There were five indicator species found in total for the sites studied. Four are indicators for Dolomite, which are *Opuntia humifusa*, *Physalis heterophylla*, Rough leafed cluster, and Thin leafed grass. The indicator for Sand was *Anemone cylindrica*.
- ❖ Infiltration Rates for the three types of sites varied. Gravel Hills showed the slowest, Sand had a faster rate, and Dolomite had the fastest rate of infiltration on average. (Figure 4)
- ❖ There was only a significant difference between Dolomite and Gravel Prairies and Sand Prairies were not significantly different from either.
- ❖ Vegetation cover did not show a strong relationship to infiltration rate. (Figure 5)

Figure 4: Average infiltration rate measured for the three types of dry prairies using Standard Error of the Mean.

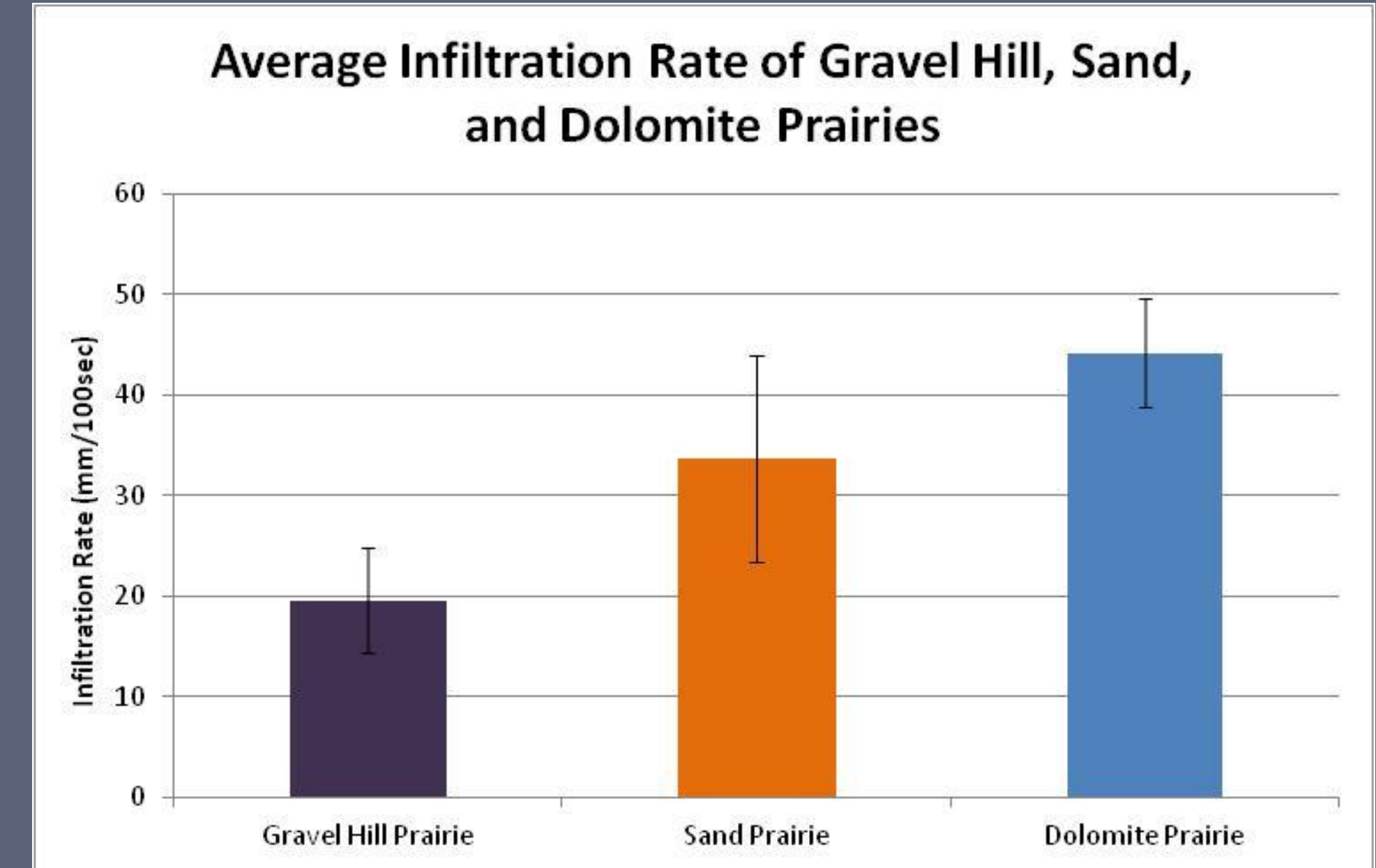
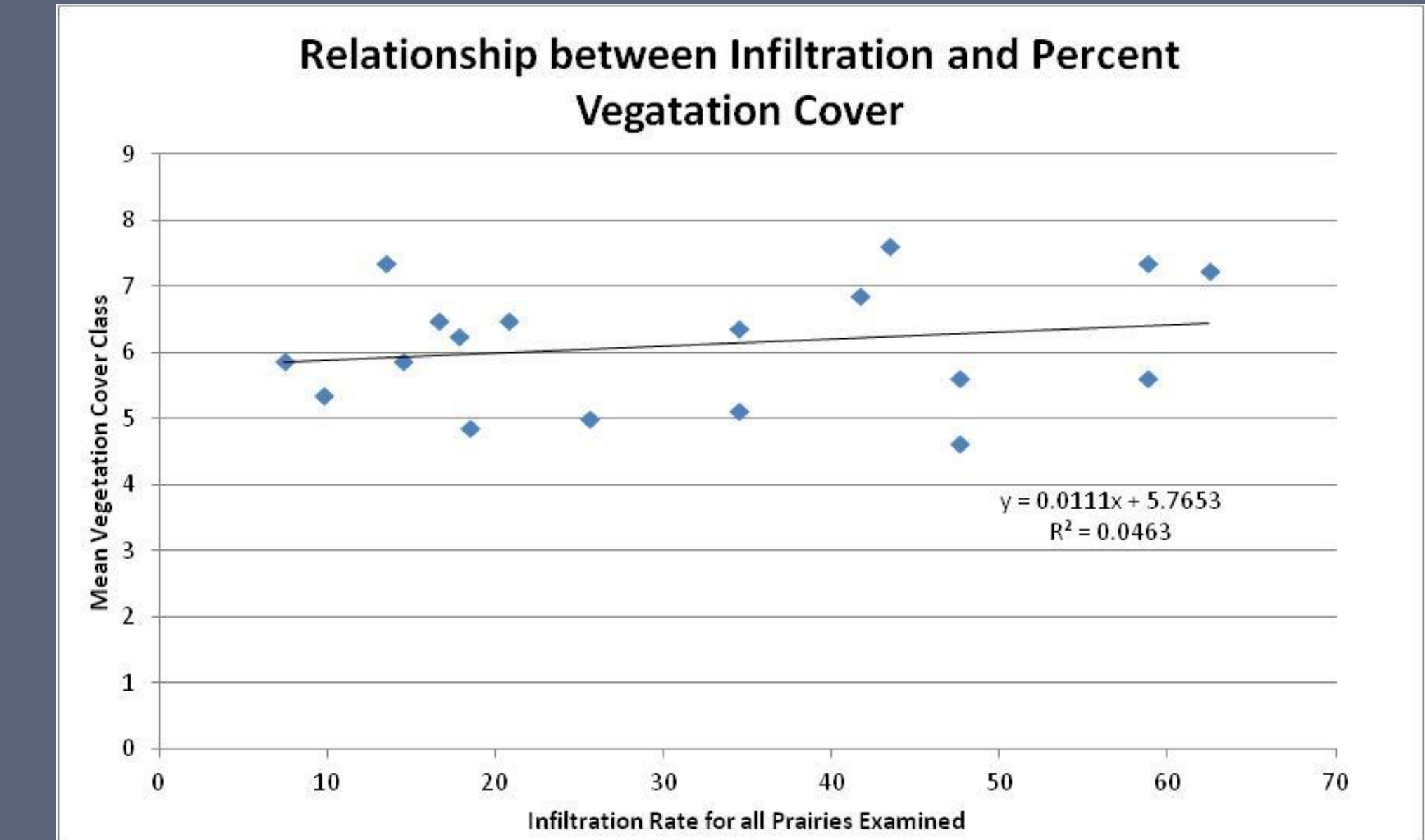


Figure 5: Relationship between infiltration rate at dry prairie sites and the amount of vegetation cover found in that location.

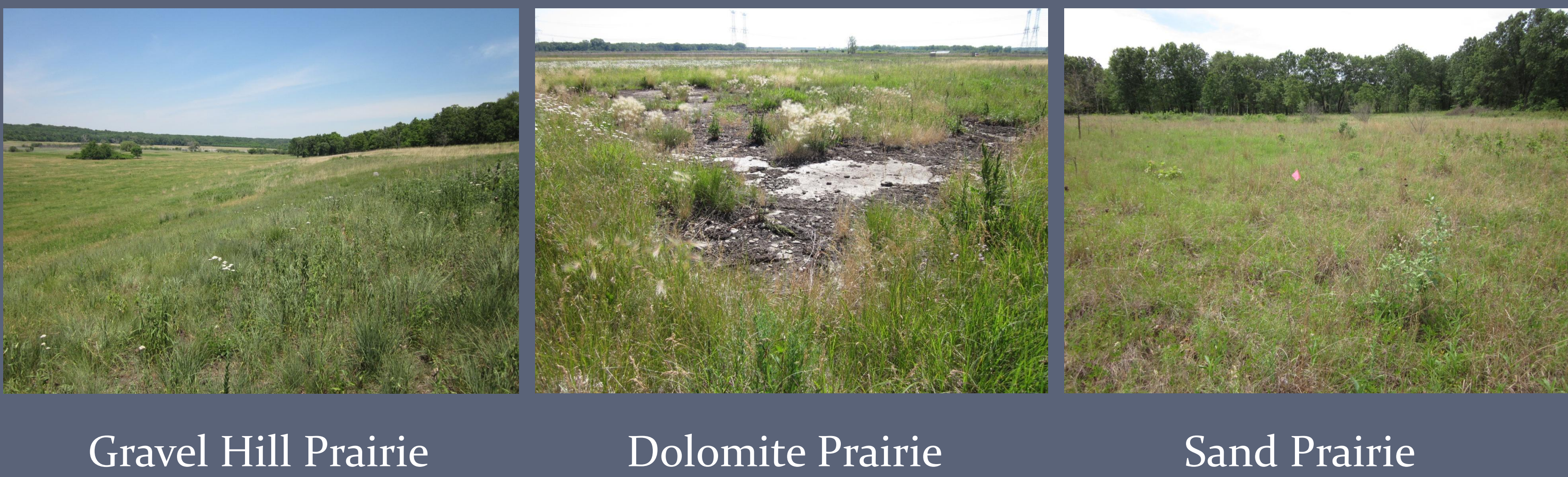


Discussion

As expected some species showed strong association with particular site types over the other sites. In addition some species were extremely common and showed a general association to all the site types, indicating that these are generalist species. There were very few indicator species, and none for Gravel Hills at all. This is likely due to the many observed differences between the sites and the lack of continuity in the species composition between them. Sand also only showed one indicator because it was divided into two main site clusters that were very different from each other likely due to differences in available moisture. Dolomite prairies showed the most continuity as a group and the 5 sites had much more species in common and therefore had multiple indicators.

Interestingly while Gravel Hills and Dolomite Prairies showed the greatest difference in infiltration the two had the closest association in the ordination. From further analysis it appeared that infiltration rate may not have a significant impact on the amount of vegetation in a prairie, but that does not discount a possible effect on the types of vegetation that will be found there.

To further this research additional investigation into the effects of varying soil texture and nutrient levels on species composition in these environments will be conducted.



Methods

Field Methods:

- Plant surveys taken at all study sites using a 20m x 20m plot broken into 16 5m by 5m quadrats. (figure 1)
- Four or more 5 by 5m inner quadrats examined within each 20 by 20 site.
- In the 5m by 5m quadrat all species were identified and cover class was estimated using a cover class scale.
- In the .5m² quadrats all species of plants were identified and their cover class was determined as well as number of individuals
- Soil was collected from each site
- An infiltrometer was used to measure the rate at which water infiltrated into the soil at each site, at two different locations within the 20m x 20m plot. (Figure 2)
- Using R an ordination was made of the species found to occur in all sites according to importance values. An indicator species analysis was also run in R to find key species that identify the site types and can serve to distinguish one type from another.

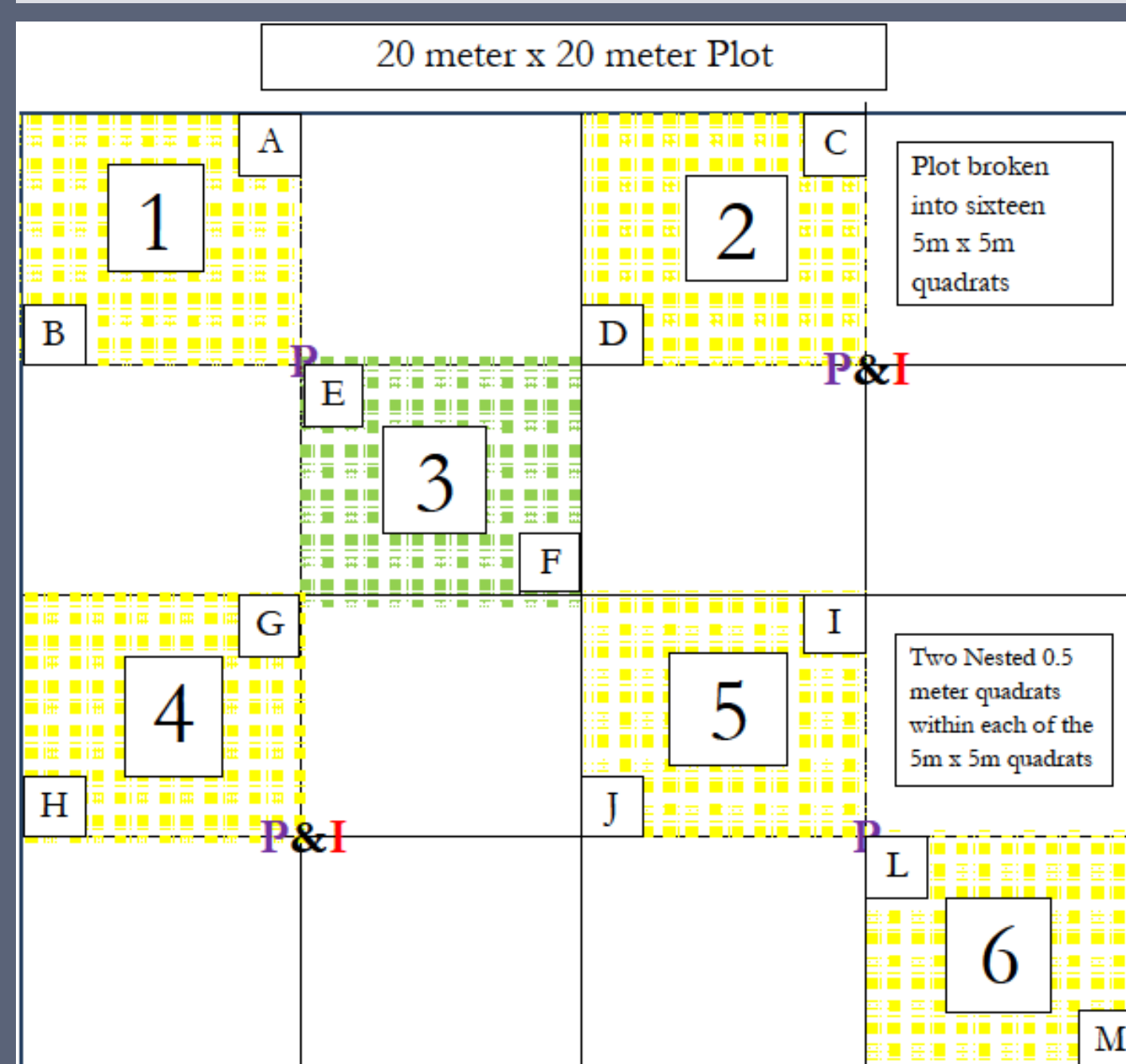


Figure 1: Schematic of field method used in plant surveys.

Figure 2: Infiltrator used to measure rate water infiltrates into soil

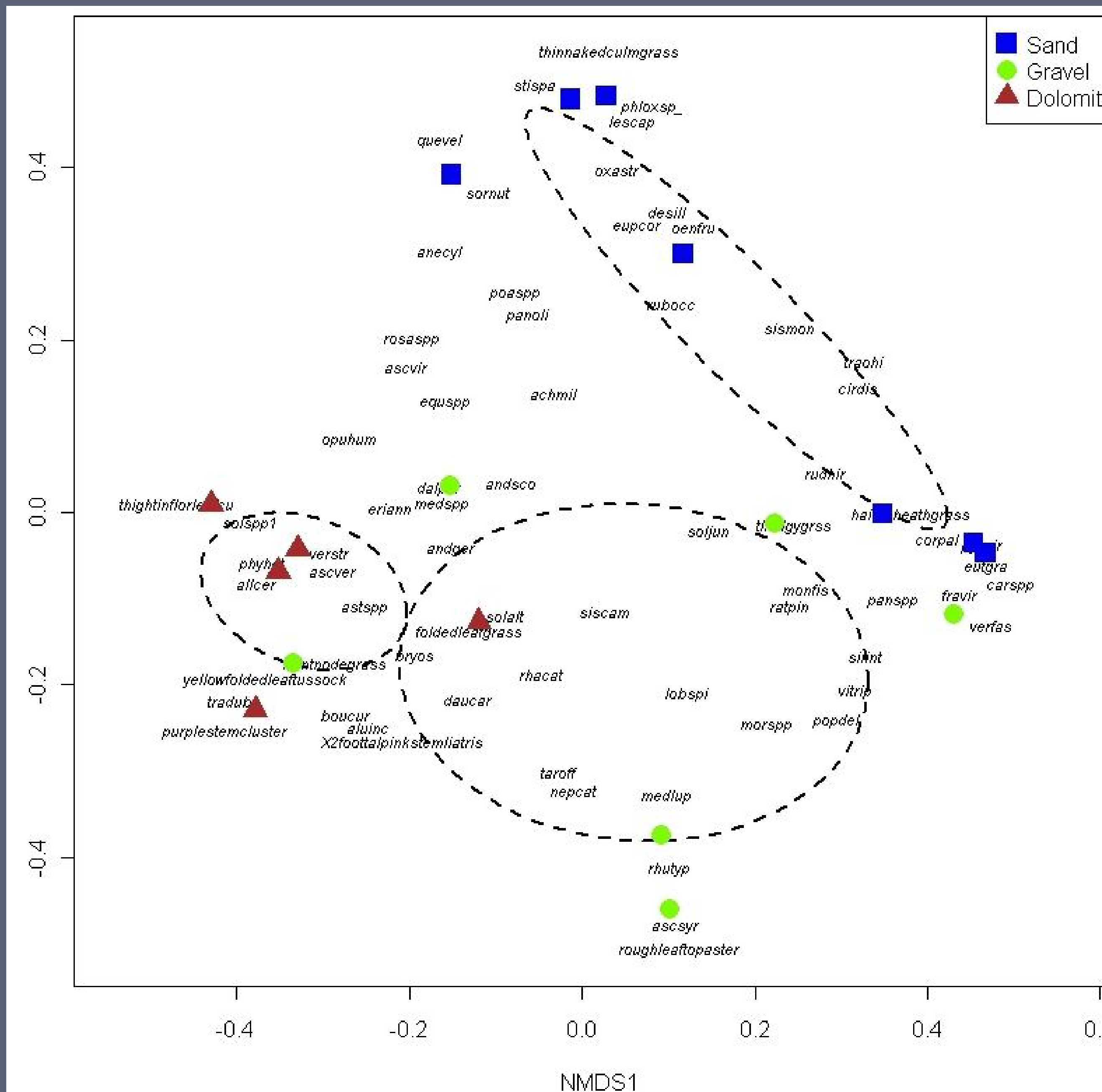


Figure 3: Above is the ordination of the sites using the importance values of the species found in the vegetation surveys. The importance values used were calculated by finding the relative frequency, relative density, and the coverage of the species and then adding these figures together.