University of Zabol
Graduate School
Faculty of water and soil science
Department of Rangeland and watershed management

The Thesis Submitted for the Degree of M.Sc (in the field Of Rangeland management Science)

Determination of the suitable method measuring for *Astragalus* canopy cover and density and investigation the spatial pattern distribution in the shrub lands of *Astragalus* in Lashgardar_ Malayer

Supervisors:
Dr. A. Fakhireh
Dr. A. Rohimoghadam

Advisors:
MSc. S. Noori
MSc. B. Fattahi

By:
S. Darabi

February 2013

Abstract

The appropriate information is necessary for management of rangeland vegetation. This information provided by measuring vegetation characteristics. Therefore, determine the simple and low cost methods whit high accuracy is necessary for measuring of vegetation characteristics. The majority vegetation type of Zagros mountainous rangeland is shrub land of Astragacantha; so the purpose of this study was to compare different measuring methods of cover percentage, density and determining the spatial patterns of Astragacantha. In order to this measuring, three ecological site of high, moderate and low density of Astragantha were selected in the Lashgardar_Malayer protected area in Hamadan province-Iran. In each site three unit of one hectare area were defined. In each unit we used three transect (50 m) and 54 plots (3 m^2) by systematic-random method. Linear transect was determined as control method for compare of measuring methods of Astragacantha cover percentage in units. Other methods were containing two perpendicular diameters, estimated at 10 × 10 plot, estimate the theoretical in plot and point transect. Also to measure the density of a control method (counting all individuals of Astragacantha in one unit per each site) was selected and distance methods of measuring density run at all 9 units of three sites. These methods were compared with together and with control unit by considering accuracy, precision, and time. At 9 units we used Johnson & Zimmer, Pillow, Hopkins, T-square, and Hines methods for determining the spatial pattern of Astragacantha. Sort, calculate and summarize the data in Excel and statistical analyzes were performed with the software SPSS16. In order to comparison of different methods for estimating density and cover, One Way Analysis of Variance (ANOVA) was used and to understand which method shave significantly different Duncan test was used. Based on three criteria in terms of precision, accuracy and time, methods for measuring the density were compare dandit was found the most efficient method. Results showed that cover percentage of Astragacantha at three sites low, medium and high density was 6.36%, 16.15% and 20.57%, respectively. Comparison of methods for measuring the cover percent showed that the most efficient method for point transect method was determined. Actual density of Astragacantha in low, medium and high density sites was 0.51, 1.07 and 2.76 individual per square meter, respectively. Ingenerally, closest individual, second and thirdclose individual are the reliability methods for measuring of density. By considering Hopkins and Pillow indicatorsof spatial pattern, the results showed that spatial pattern at medium and high density sites was random and at low density sit was clumped.

Key words: Density, Cover, Spatial pattern, Astragacantha, Lashgardar-Malayer.