Fluorometry--An Evolving Methodology for Range Animal Ecologists

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Introduction Fluorometry is an optically based tool for identifying pre and post-digest plant material (Anderson et al . , 1998) . Though similar to near-infrared reflectance spectroscopy (NIRS) , fluorometry offers a potentially superior capability for discriminating differences among plant materials because of its multidimensional characteristics . Research suggests that emission data from the blue and green regions of the visible spectrum are rich in information necessary for determining chemical differences among plant species . To date a neodymium : yttrium aluminum garnet (Nd :YAG) laser , a Xenon-arc lamp , and most recently high intensity light emitting diodes (LED's) have successfully been used as the excitation light sources . Manipulating the solvent used to extract fluorophores can enhance the methodologies utility . Though organic solvents (chloroform in particular) extract plant fluorophores they also extract chlorophyll that emits in the red portion of the spectrum . The red fluorescence tends to mask fluorophores that appear most important in identifying plants , those in the blue and green regions of the spectrum . Physiologically buffered saline (PBS) is currently the solvent of choice . It does not remove the chlorophyll and is environmentally benign . Furthermore by altering the pH of PBS different blue and green fluorophores can be extracted (Danielson , 2006) . To date the exact fluorophores giving the spectral finger prints are unknown . However , this does not detract from the methodologies ability to discriminate among species , especially , when multi-way principal component analysis (MPCA) is used to tease apart the various spectra (Obeidat et al . , 2007) .

Material and methods Figures and tables will outline the development (1996 through 2007) of fluorometry as a range animal ecology tool .

Results and discussion Emission spectra from peak count (intensity) ratios , the entire fluorescence data set using polynomial regression models , confidence interval plots , discriminate analysis , and 3-dimensional plots of the entire fluorescence data set using several solvents and multi-way principal component analysis (MPCA) have been successful in differentiating among species . A lightweight laptop activated multi-source portable LED spectrofluorometer exhibits potential to acquire data in the field .

Conclusions Fluorometery is an evolving rapid non-invasive method range animal ecologists can use to determine botanical composition of pre-and post-digested plant material for managing nutrition and health of free-ranging animals .

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