

## **Ecophysiological Study of *Rhanterium epapposum* as a Range Plant at Al-lebbah Area in the Northern Region of Saudi Arabia**

**Haifa A. S. Al-Hathloul**

Most of the area of Saudi Arabia can be classified as arid or semiarid ecosystems thus, rangelands make up over 74% of the area. Grazing and agriculture have traditionally been the pattern of life for centuries. Before the turn of the century, rangelands offered most of the livestock needs when the country population was low and the hema system existed. In the last few decades, livestock population in the country increased in association with an increase in human population. Over-grazing, over exploitation of rangelands, human activities, and poor management policies disrupted desert ecosystem causing dramatic changes in vegetation and soil leading to rangelands deterioration thus desertification.

Shrubs in rangeland play a major role for livestock feeding in the rangelands of the Kingdom of Saudi Arabia. However, there is lack of information on autecological studies such as phenology, seasonal nutrient variation and germination on some of important rangeland shrubs. Thus, an important shrub for livestock, *Rhanterium epapposum*, was selected to conduct this study on the northern region of Saudi Arabia.

The main objectives of the study were:

- i) To evaluate the influence of protection on the vegetation composition, cover, density and frequency.
- ii) To study the phenological progression of *Rhanterium epapposum* over the growing season on natural rangelands.
- iii) To study the influence of grazing and protection on seed production of *Rhanterium epapposum*.
- iv) To study nutrient variation of *Rhanterium epapposum* in relation to phenological progression over a growing season period.
- v) To determine the effect of storage on seed germination.

Vegetation and phenological studies were conducted in a fenced area located 5 km south of Al-Jouf airport. Plant materials were collected at different phenological stages for nutrient evaluation. Matured fruits/seeds of *Rhanterium epapposum*, collected during 1996, 1997, 1998, and 1999, were evaluated on a greenhouse and a growth chamber for germination.

Data were analyzed using the program SAS through the Analysis of variance (ANOVA) and the differences in means were determined by the least significant differences (LSD)

Studies of the vegetation characteristics and general survey indicated a significant decrease in plant density and vegetation cover in the open rangeland compared with the protected area. In addition, more

palatable species were found on the protected site compared with the open site.

Phenological study showed that *Rhanterium epapposum* grows during the fall, winter and early spring (the rainy season and mild temperature) and senescence during the hot dry months of summer. *R. epapposum* completes its growth cycle in a few months and from May onwards the species withers, gradually shedding its dry leaves and ripened flowerheads (fruits). Overgrazing had significantly decreased the flowerheads and thus fruits production on an open rangelands compared with the protected site.

Moisture content was significantly decreased with the phenological progression of *R. epapposum*. The new growth, early on the season, has moisture content of over 80% dropping to about 50% by the end of the growing season (early summer). Samples collected at different phenological stages showed high variation in some chemical composition, especially crude protein, where the new growth on early season has crude protein of about 24% dropping to just above 8% by the end of the season. *In general, R. epapposum* had low minerals (phosphorus and potassium).

Germination of *R. epapposum* seeds collected from different years showed a general low germination percentage. Under growth chamber, germination ranged from 13% for both 1996 and 1997 to 19% for 1999;

however, germination on greenhouse showed a higher germination percentage ranging from 40% for 1998 to 61% for 1997 with no significant differences between years.