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HEIGHT-WEIGHT RELATIONSHIP IN SOME PASTURE GRASSES OF SEMI-ARID RAJASTHAN

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The weight distribution in grasses with respect to height is known to vary with the species, cultivar and climate (Shankarnarayan et al. 1969; Rai et al. 1980). Hence the height-weight relationship of some strains of the major pasture grasses of semi-arid Rajasthan viz., *Dichanthium annulatum*, *Cenchrus ciliaris* and *C. setigerus* growing at the CAZRI Research Farm, Pali have been worked out. The regression equations of the form $Y=AX^b$ (or $\log Y=\log A+b \log X$) were computed from average height-weight data of 5 random plants as obtained following the description of Rai et al. (1980). The experimental plants were two year old and had been managed by cutting every year. The regressions were compared for equality (Snedecor and Cochran 1967) before computing the overall regression for each grass species.

Plant weight showed significant regression on per cent plant height (from apex) in all the grass strains of *C. ciliaris*, *C. setigerus* and *D. annulatum* studied. However, the differences between the indivisual regression coefficients of strains (Table 1) were non-significant within each species. Rai et al. (1980) had, however, reported non-equality of height-weight regressions in different cultivars of *C. ciliaris* and *Panicum antidotale* during the second year of growth without any cutting management in the first year.

The observed similarity in regression coefficients within each species might be the effect on the dry matter distribution of the cutting regime and the environment over longer time at a single location. It may, therefore, be worthwhile to study the changes in dry matter distribution in perennial grasses as the grass stand becomes older and cutting schedule is followed.

The overall regressions of the three different grasses studied (Table 1) were significantly different from each other. Thus it appears that the height-weight distribution is a characteristic feature of each grass. Das et al. (1964) and Rai et al. (1980) also reported different height-weight regression equations for different grass species.

Perusal of the common regression equations showed the usual uneven disiribution of dry matter throughout the height of grass. Fifty per cent dry weight was estimated to be found in 24, 25 and 20 per cent height (from base) in *C. ciliaris*,

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Table-1. Height (X)-Weight (Y) relationship in pasture grasses

Grass strain	Origin	Regression bequation (Y = A X	Per cent variation in Y explained
Cenchrus ciliaris			
CAZRI 75	Australia	$Y=0.0033\ X^{2.2176}$	98.57
CAZRI 358	Barmer	$Y=0.0073\ X^{2.0416}$	99.12
CAZRI 1106	Jodhpur	$Y=0.0074\ X^{2.0355}$	97.59
CAZRI 1263	Australia	$Y=0.0016\ X^{2.3820}$	99.00
Overall		$Y=0.0030\ X^{2.2426}$	98.14
Cenchrus setigerus			
CAZRI 1	Delhi	$Y=0\ 0032\ X^{2.2244}$	99.45
CAZRI 76	Australia	$Y=0.0075\ X^{2\ 0537}$	99.62
CAZRI 175	Jodhpur	$Y=0.0227\ X^{1.7752}$	97.16
CAZRI 569	Gopalpura	$Y=0.0270\ X^{1.7522}$	98.52
Overall		$Y=0.0122\ X^{1.9267}$	96.97
Dichanthium annulatum			
CAZRI 485	Australia	$Y=0.0064\ X^{2.0583}$	97.88
CAZRI 491	Australia	$Y=0.0174\ X^{1.8076}$	95.98
CAZRI 495	Australia	$Y=0.0224\ X^{1.7625}$	96.53
CAZRI 679	Barmer	$Y=0.0104\ X^{1.9272}$	95.82
Overall		$Y=0.0131\ X^{1.8806}$	96.05

C. setigerus and *D. annulatum*, respectively. In *C. ciliaris* the same was reported in 23 to 39 per cent at Jhansi (Rai et al. 1980).

As regards utilization, the common regressions showed that 20 per cent utilization is achieved when about 51 per cent of height in *C. ciliaris*, 47 per cent in *C. setigerus* and 49 per cent in *D. annulatum* is grazed over or removed by cutting from top (Table 2). Similar level of utilization in *C. ciliaris* was reported at greater height at Jodhpur (Das et al. 1965) and lesser at Jhansi (Rai et al. 1980). Likewise, for 40 per cent utilization the corresponding height decrement worked out to about 69, 67 and 71 per cent for *C. ciliaris*, *C. setigerus* and *D. annulatum*. For *C. ciliaris* the estimate

Table 2. Estimated utilization of dry matter with respect to plant height in some pasture grasses

Dry matter utilized (%)	Plant height removed from top (%)		
	Cenchrus ciliaris	Cenchrus setigerus	Dichanthium annulatum
10	37.3	32.5	34.1
20	50.8	46.6	49.3
30	60.8	57.5	61.1
40	69.1	66.8	71.2
50	76.4	75.0	80.2
60	82.8	82.4	88.4
70	88.7	89.3	95.9

was again intermediate between those reported for at Jodhpur and at Jhansi by the above workers.

The present study, showed that power curves depicting the height-weight relationship in *D. annulatum*, *C. ciliaris* and *C. setigerus* are distinct and statistically different from each other. However, within each species a common power regression may appear valid for some diverse genotypes (strains) grown for longer period at a single location with cutting management.

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