The DWR approach review: Measuring the botanical composition of native grassland in East Sumba Regency, East Nusa Tenggara Province

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Abstract. East Sumba Regency is an area with great potential for beef cattle development because of its large area and sufficient local forage resources as feed. Native grassland is a source of forage for ruminants, especially by smallholder farms in rural areas. This review paper aimed to analyze the Dry Weight Rank method as a method of measuring the botanical composition and distribution of forages. Referring to measurements of botanical composition, vegetation on grassland in the experimental plots and field studies can be explained using different parameters (plant density, cover, frequency or yield proportion). Each of the obtained parameters is capable of describing different features, which under certain circumstances may be correlated with each other to some extent, but are not completely equivalent. Therefore, the choice of parameters to be assessed depends on the objectives of the study. The choice of method depends primarily on the accuracy required, the affordability of efforts, and the available resources. The Dry Weight Rank method developed by Lt Mannetje and Haydock is one of the techniques referred to as a tool for measuring the botanical composition of native grassland.

1. Introduction

Native grasslands in the East Sumba Regency dominate land use in almost all regions. Grassland extension is a significant advantage for smallholder farms to support the year-round availability of sustainable feed. East Sumba Regency is one of the districts that have the potential to be established by the beef cattle industry in East Nusa Tenggara Province [1,2].

The botanical composition of grassland vegetation, including past management history, is a reflection of many variables. In changes in structure, changes in these variables will be reflected. Botanical composition has several attributes that can be described or calculated for descriptive purposes. The composition of the indigenous grassland is not constant, due to changes in composition due to the impact of the climate, the conditions of the soil and also the use of the soil by livestock [3]. Knowledge of the botanical composition and types of forage that exist in natural pastures is necessary in order to increase the level of productivity of this livestock system. To our knowledge, this information is still limited. Therefore, this review paper aimed to analyze the Dry Weight Rank method as a method of measuring the botanical composition and distribution of forages.
2. Methods
This research used literature review and field studies to evaluate the strengths and weaknesses of the DWR method to measure the botanical composition of native grasslands. In 1963, Lt Mannette and Haydock [4] developed the Dry Weight Rank (DWR) method for the study of the botanical composition of native grassland to estimate the species composition of grassland on a dry weight basis quickly and accurately.

For each species, the Dry Weight Rank method determines the dry weight proportion (DWA percent for species A) from the percentages of cases in sampling quadrats, taking the first (A1 percent), second (A2 percent) and third (A3 percent) ranks based on dry weight (visual estimates). These proportion were weighted by the empirical coefficients 0.702, 0.211 and 0.087, and added according to:

$$\text{DWA}\% = 0.702 (A1\%) + 0.211 (A2\%) + 0.087 (A3\%)$$  [4,5]

Using linear multiple regression, the coefficients were calculated using data sets from which the exact dry weight ratios of all organisms were known.

3. Results and discussion

3.1. Imperative parameters to depict the botanical composition of native grassland

3.1.1. Density. This parameter is of centrality to survey the quantitative impacts of measures to control or control weeds on the number of plants or plant parts, more frequently than not associated to the chosen target species. In hone, the recognizable proof of single individuals may be a tremendous challenge inside the case of a tall thickness coalescing species that create stolons, those making more stems from the same root system, or those having in common a clonal improvement. But thickness can be recorded undoubtedly in such cases as long as a standardized checking unit is characterized. Underneath specific circumstances, the thickness of stems can be more imperative than the number of individuals to assess the occasion of a species and depict its changes over time [4-6].

In meadows, the thickness of tillers per unit locale is frequently utilized for grass species [3-6]. If the measure of plants or plant parts is moderately homogeneous, their density gives a backhanded figure of their biomass as well. Additionally, on the off chance that the checked units are significant to propagation or increase forms, thickness information moreover gives data on populace elements.

3.1.2. Cover. This is the degree of the considered locale that's secured by the vertical projection of the above-ground plant parts. Considering because it were the topmost plant parts, the complete cover cannot outperform 100% and the evaluated parameter is called best cover. The qualification between 100% and the most excellent cover compares to the degree of vegetation gaps, talking to the degree of revealed soil. Within the occasion that the assessment of the extent of revealed soil focuses at assessing hurts due to, for case, root vole, mole, grubs, trampling and track hurt, it got to be examined right after cutting or brushing. In case the point of the examination is instep assessing the security of soil against deterioration given by the vegetation, the assessment may be significant besides with undisturbed vegetation. In many cases, cover to boot considering the covering plant parts and can at that point be more than 100% [4]. Additionally, it in addition recognized between basal cover and canopy cover, where the part because it were considers the plant preface, in spite of the fact that the minute one accounts for all the above-ground plant parts [4,5]. Cover is most as regularly as conceivable utilized in vegetation science and plant physiological considers almost. Be that because it may, best cover is of tall congruity for the appraisal of affirmation against soil crumbling, as there's a strong relationship between vegetation cover and soil deterioration.

3.1.3. Frequency. This is the degree of cases, in which a certain species can be distinguished at a characterized number of recognition centers or sub-areas. Repeat or possibly gives demonstrate of consistency of scattering than of riches in case of individuals creating clumped. This parameter is most
fitting to investigate vegetation stream when recognition plots are over and overstudied in the time course of action [5-7] induce specific commitment from repeat values by calculating the degree of a certain species repeat over the entire of the frequencies of all species.

3.1.4. Yield proportion. This is the relative degree (weight-%) of harvestable above-ground dry matter biomass of a certain species or a species bunch related to the by and large dry matter abandon [5,7]. This parameter is particularly sensible for agronomic considers with an exceptional center on scrounge era and scrounge quality. Yield degree on its have additionally gives information into the competitive relationship between species, and does not on a very basic level donate information on their incomparable riches, unless this information is combined with yield data. In this case, the thing of the abandoned degree of a certain species by the resign of the entire community licenses to gauge of the yield of this species. Depending on the analyzed parameter, the meaning and regard of the delivered information change. For case, a species with outstandingly few people homogeneously spread over the locale being assessed in combination with other tall, impartially dispersed species would without a doubt show tall repeat and plant thickness but moo cover and moo abdicate extent [5-7].

The same species, in the event that developing clumped, would still display tall plant thickness, but moo recurrence both abdicate extent, as well as the cover, gives data on the quantitative event of species. In spite of the fact that being two distinctive parameters to portray vegetation, it is frequently expected that they grant comparable estimation values. This applies especially to brief vegetation, but not in the case of taller vegetation. For occurrence, there are important contrasts when spot-wise conveyed tall plants are developing in thick, brief vegetation. Greater contrasts between the cover and yield degree are in common to be expected by utilizing beat cover instead of cover which as well considers covering plant parts and communicates it as a percent of the aggregate of the cover of all species. The appraisal of a plant community by assessing both abandon degree and cover. Depending on the assessed parameter, strong contrasts inside the extent happen for some species. Centers out that examinations centering on yield degree are unsatisfactory to classify plant communities from a phytosociological point of view [5-8].

The coefficients were decided by infers of coordinate diverse backslide utilizing sets of data from which the exact dry weight degrees of all species were known. They were balanced by Jones and Hargreaves [8] to 0.714, 0.247, and 0.039 from helping sets of data, in show disdain toward of the truth that the creators these unused coefficients do not lead to impressively predominant comes almost. DWR was made from the Rank Methodology of De Vries and maybe a speedy technique since there's no require for cutting and hand-separating tests. The onlooker has because it was to select whether there's a more conspicuous weight of one species than of another. Be that because it may, the methodology requires experienced spectators, and planning as of now is principal. Inconveniences may rise since of sweeping conceivable contrasts in dry matter substance between species, and since a couple of species are more unmistakable to the eye than others and tend to be overestimated [5-8]. One of the confinements of the technique is that the calculated dry weight degrees can never outperform the regard of 70.2%. This will be overcome by assigning to start with and minute positions to any species which involves at smallest 85% of the by and large dry matter of a quadrat [8]. Another issue arises when there's an unaltering relationship between species dominance and quadrat abandon. On the off chance that a specific species ceaselessly takes to start with rank in tall yielding quadrats and another one persistently takes the primary rank in moo yielding ones, the past will be disparaged and the final said overestimated. This will be unraveled by applying the yield change [8]. Lt Mannetje and Haydock [4] did not find an effect of quadrat degree on the result.

4. Conclusion
The DWR strategy is utilized to decide species composition counting in the meadow in East Sumba Rule. DWR comprises of watching different quadrats and positioning the three species which contribute the foremost weight within the quadrat. It is critical to set up a photo plot and take both close-up and
common see photos. This permits the depiction of asset values and conditions and outfits visual to prove of vegetation and soil changes over time.

Areas of Utilize of DWR have been tried in a wide assortment of vegetation sorts and are by and large considered reasonable for grassland/small bushes sorts or understory communities of a expansive bush or tree communities. It does not work well on huge bushes and trees.

One advantage of the Dry Weight Rank Strategy is that a huge number of tests can be gotten exceptionally rapidly. Another advantage is that it bargains with gauges of generation, which permits for way better elucidation of the information to form management decisions. It can be tiring in conjunction with recurrence, canopy cover, or comparative surrender strategies. Since it is easier to rank the beat three species in a quadrat, there's less eyewitness predisposition. The impediment with this procedure is that, by itself, it'll not deliver a dependable appraise of plant standing trim, and it accepts there are few purge quadrats. In numerous expansive bush or scanty forsake communities, a tall rate of quadrats are purge or have as it were one species display. The quadrat estimate required to address these concerns is frequently unreasonable.

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