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Analysis of green fodder preferences from the villages covered under FTD'S of AICRP on forage crops and utilization

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Abstract
This study investigates the analysis of fodder crop preferences among farmers in Ahilyanagar district of Maharashtra state. The sample was constituted 120 farmers drawn from three talukas of Ahilyanagar district. The farmers were interviewed with the help of specially designed interview schedule. The analysis was carried out with Garrett's ranking technique. Garrett's ranking technique was applied to assess fodder crop preferences among Forage Technology Demonstration (FTD) cultivators. The analysis revealed a clear hierarchy of choices, with Lucerne emerging as the most preferred crop (mean score: 60.70), followed by Hybrid Napier (55.37), Berseem (52.45), Oat (42.29), and Maize (39.16). This method effectively aggregated individual rankings, minimizing bias and enhancing the reliability of the findings.

Keywords: Oat, crop preference, cultivators, Garrett's ranking technique, fodder

Introduction
Green fodder serves as a nutritionally rich and cost-effective feed resource, offering a viable alternative to expensive concentrate feed ingredients in livestock diets. (Mohini *et al.*, 2007) [16]. Green fodder provides vitamins and minerals along with energy, and improves digestion. It has been found that by upgrading the feeding system based on green fodder, the cost of milk production may greatly be reduced (Jha & Tiwari, 2018) [5]. Forages are 5-14 times cheaper source of important feed ingredients like digestible crude protein and total digestible nutrients than concentrates (Agrawal *et al.*, 2008) [1]. Growing fodder crops in combination with legumes has the potential to improve fodder palatability and digestibility (Kumar *et al.*, 2016; 2018) [9]. Fodder crops are inherently rich in dietary fibre, energy and crucial nutrients. It is well known that cereal fodder crops are energy rich and leguminous fodders are protein rich. Apart from that the green fodder crops help in economizing the cost of milk production by providing less expensive source of nutrients in sharp contrast to concentrates and thereby paving the way for sustained profitability (Singh and Kataria, 2017) [18].
Green fodder is the important source of carbohydrate, fat, protein, available minerals and vitamins and water and can be considered as complete feed for adult dairy animals. Feeding green fodder increases the availability of carbohydrate, fat, protein, available minerals and vitamins and water hence, feeding of optimum quantity of green fodder helps to increase the milk production. Green fodder contains comparatively higher amount of minerals and vitamins which ensure better productive health in dairy animals. Provision of green fodder in the diet of dairy animals has been shown to reduce the inter-calving interval by supplying essential minerals and vitamins that facilitate timely onset of oestrus. This nutritional intervention contributes to enhanced reproductive efficiency and overall lifetime productivity of dairy animals. Nutrients present in green fodder are more digestible, thus, it promotes better growth and body weight gain in growing dairy animals and grow faster and attaining reproductive weight at early age increases the life productivity of dairy animals. Green fodder contains secondary plant metabolites and some have medicinal properties and green fodder provides carbohydrate, fat, protein, available minerals and vitamins in balance quantity, therefore, dairy animals fed with ample amount of green fodder are less prone to

diseases. Secondary plant metabolites saponin increases meat shelf life. Tannins enhance meat colour and phenols increases antioxidation potential of milk. Green fodder contains all essential minerals that promote strong and healthy bone and teeth (Kumar *et al.,* 2015) [11].

Microorganisms present in green fodder help in improving digestibility of crop residues under mixed feeding system. Green fodder is bulky in nature. Green fodder provides satiety to ruminant animals, which helpful to different rumen physiology and rumination. Feeding green fodder during early age of dairy animals' causes fastening the development of rumen. Concentrate is the costliest item of dairy farm. Green fodder provides an economic nutrient source which is highly relished by the animals. Leguminous green fodder contains moderate quantity of DCP (Digestive crude protein) and higher quantity of TDN (Total digestive nutrients) that can replace certain quantity of concentrate. Feeding of green fodder fastening the growth of young ruminates. Grow faster and attaining marketing weight and reproductive weight at early age reduces cost of animal rearing and increases profitability of dairy farm.

In India, green fodders are being cultivated in 8.4 mha land comprising of 5.23% area of our country. The area is found to be almost static for the last two decades (Koli and Bhardwaj, 2018) [7]. Not only that, the country is maintaining about 15% of total livestock population of the world in 2.29 % of the global land area (Kumar *et al.*, 2023). According to the Union Ministry of Fisheries, Animal Husbandry and Dairying. Government of India, ICAR-Indian Grassland and Fodder Research Institute (IGFRI), Jhansi, has estimated that there is a deficit of 11.24, 23.4 and 28.9% in green fodder, dry fodder and concentrates, respectively, in our country. The deficiency may further be increased at the rate of 1.23% annually with the growing livestock population and considering the present production of fodders. Among different reasons, change of land use patterns, rapid urbanisation, negligence in maintaining pasture land, focus to use land for commercial crops, increase number of unproductive dairy animals, very few large sized commercial dairy farm, non-availability of quality fodder seed are important for decreasing green fodder availability for dairy animals (Begam *et al.,* 2024) [2].

Despite a livestock population of over 500 million, India allocates only around 4% of its cultivable land to dedicated fodder crops. This is drastically insufficient to meet the nutritional demands of cattle, buffaloes, goats, and sheep. Most agricultural land is reserved for staple food grains and cash crops due to their higher market value and government procurement support. This imbalance between demand and supply severely reduces the availability of quality fodder year-round (Kaur *et al.,* 2025) [6]. Constraints include threats from animals, pests, diseases, low prices, poor quality seeds, and insufficient high-quality seeds. Successful fodder cultivation demands fertile land, quality water, increased fertilization, and proper management. Frequent harvesting leads to substantial expenses, and the scarcity of timely inputs, along with limited cultivable land, hinders fodder yield improvement. Inefficient preservation and storage techniques elevate the risk of wastage, discouraging substantial investments in fodder production (Dagar, 2017; Biemond *et al.,* 2012; Meena *et al.,* 2018; FAO, 2011) [4, 3, 13]. The availability of good-quality seeds or planting material is a significant limitation contributing to the reduced area and production of forage crops (Parihar, 2010) [17]. Productivity and seed availability are crucial considerations, since forage crops are primarily perennial and cultivated by vegetative propagation for enhanced vegetative potential, resulting in low seed productivity (Vijay *et al.,* 2018) [19]. Indeterminate growth, uneven maturity, seed shattering, ill filled seeds, seed dormancy, and climatic factors such as photoperiod, thermos-period, and humidity, among others, are considered physiological limitations for fodder seed production. Weather extremes represent a climatic constraint, while factors like low density of ear-bearing tillers, susceptible to lodging, poor harvest index, lack of seed production technology fall under management factors for fodder seed production. The absence of an exclusive forage seed market further adds to these challenges, collectively limiting the availability of quality seeds for fodder crops (Vijay *et al.,* 2013) [20].

It is necessary to address the opportunities related to increasing the fodder yield of cultivated fodder crops and efficient use of crop residues. The selection and application of fodder production technologies should conform with the framework of sustainability criteria. Potentially important technologies that can make a significant increase in productivity of both crops and animals within the system should be promoted. This shall consequently increase farmers' income and also meet the demand of raising human population (Misra *et al.,* 2007; 2015) [15]. Adequate supply of feed and fodder is crucial for improving livestock productivity. Feeding is the foundation of livestock system and it directly or indirectly affects the entire livestock sector, including animal productivity, health and welfare and the environment (Makkar, 2016) [12].

The present study aimed to analyse the preferences of farmers regarding fodder crops in villages covered under the Forage Technology Demonstrations (FTD's) of the All India Coordinated Research Project AICRP on Forage Crops and Utilization. As part of this initiative, various FTD's involving different fodder crop technologies were distributed among the participating farmers. These demonstrations were designed to introduce and promote improved forage crop varieties and cultivation practices, aiming to enhance fodder availability and quality at the farm level. FTD's play a vital role in promoting agricultural development and improving rural livelihoods.

Materials and Methods

Collection of Data: The study was undertaken in villages where Frontline Technology Demonstrations (FTDs) were implemented by the Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri, under the aegis of the All India Coordinated Research Project (AICRP) on Forage Crops and Utilization. From the total of 20 villages covered by the project, a purposive sample of 12 villages was selected for detailed investigation. In each selected village, 10 forage growers were identified to constitute a representative cross-section of forage growers. Data collection was carried out using a structured interview schedule specifically developed for the study objectives. Pre-testing of the interview schedule was done outside the study area. After analysing the pre-testing results, necessary modifications were done in the interview schedule regarding the wordings, statements and questions. After finalizing the research design and interview schedule, the data was collected by using the personal interview method. To achieve the defined objectives, the field survey method was adopted. All the

cultivators were personally contacted by the investigator for data collection. The investigator introduced him-self to the cultivators and explained the purpose of the visit, objectives and importance of the study with that significance and asked for co-operation for the study. The point wise information according to the prepared schedule were asked to them one by one and their responses were recorded. All cultivators had responded perfectly and all were considered as cultivators for the present study. A quantitative approach was employed to analyse these rankings, utilizing Garrett's ranking technique to convert preferences into numerical scores.

Application of the Garrett's Ranking Technique: An attempt was made to recognized the crop preferences given by the fodder cultivators. The crop preferences of cultivators are ranked by making use of Garret's ranking technique. In the given study, cultivators of Fodder Technology Demonstrations (FTD's) were asked to rank five fodder crops namely Lucern, Hybrid Napier, oat, berseem and maize on a scale from I (most preferred) to V (least preferred). Each rank assigned by a cultivator is converted into a percent position using a standard formula, which is then matched with a Garrett value from a predefined table. The mean score is derived by dividing the total score by the number of cultivators. To standardize these subjective rankings, the Garrett formula was used:

$$\textbf{Percent position} = \frac{\mathbf{100 \times (Rij - 0.5)}}{\mathbf{Nj}}$$

Where,

R_{ij} = Rank given for the i^{th} variable by j^{th} cultivators

N_j = Number of variables ranked by j^{th} cultivators

With the help of Garrett's Table, the percent position estimated is converted into scores by referring to the table given by Garret and Woodworth (1969). Then for each factor, the scores of each individual are added and then total value of scores and mean values of score is calculated. The preferences having highest mean value is considered to be the most important factor.

Results and Discussion

Garrett's ranking method is a valuable statistical tool used to analyse and interpret preference data, especially in agricultural studies where cultivators rank crops based on factors like yield, profitability, or adaptability. Unlike simple frequency counts, this method converts ranks into scores using a standardized formula, allowing for more accurate comparisons across cultivators. It helps eliminate bias from individual ranking patterns and provides a clear, quantifiable measure of overall preference. These rankings are summarized in Table 1.

Table 1: Preferences and ranking of crops given by fodder cultivators

Sr. No.	Crops	Rank given by the cultivators				
		I	II	III	IV	V
1.	Hybrid Napier	13	45	52	8	2
2.	Lucern	32	63	15	7	3
3.	Oat	16	9	21	29	45
4.	Berseem	49	3	17	21	30
5.	Maize	10	0	15	55	40

The data presented in Table 1 shows the ranking preferences of fodder cultivators for five major fodder crops: Hybrid Napier, Lucerne, Oat, Berseem, and Maize. The rankings range from I (most preferred) to V (least preferred), and the number of cultivators assigning each rank to a crop provides insight into its relative desirability based on agronomic performance, adaptability, and utility in local farming systems. Hybrid Napier was predominantly ranked III (52 cultivators) and II (45 cultivators), indicating that while it is not the top choice, it is consistently viewed as a moderately favourable option. Lucerne emerged as one of the most preferred crop, with 32 cultivators ranking it first and a substantial 63 assigning it Rank II. This strong preference in the top two ranks shows high protein content, perennial growth habit, and suitability for multiple harvests. Maize was the least favoured crop, with 55 cultivators ranking it IV and 40 ranking it V. The absence of Rank II votes and a low Rank I count (10) suggest that maize is generally considered less effective for fodder purposes. This may be due to its single-cut nature and low protein content. The ranking data provides a clear hierarchy of crop preferences among oat and berseem cultivators, with Berseem and Lucerne leading due to their superior agronomic traits, while Maize and Oat are less favoured. These findings are critical for guiding fodder crop promotion and varietal selection.

The Garrett value was determined using the Garrett ranking conversion table. In Table 2, the percentage positions are provided along with their corresponding Garrett scores. The closest matching percentage position was identified from the table and the respective Garrett score was assigned accordingly. Based on these values, a structured table of Garrett scores was created. Subsequently, rankings are allocated to different preferences according to the preferences of cultivators, using the mean Garrett score as the basis for evaluation. This systematic approach ensures a precise and reliable ranking of crop preferences given by the fodder cultivators.

Table 2: Percent position and Garrett value of crops given by fodder cultivators

Sr. No.	100 (Rij-0.5)/Nj	Per Cent Position	Garret value
1.	100*(1-0.5)/5	10.00	75
2.	100*(2-0.5)/5	30.00	60
3.	100*(3-0.5)/5	50.00	50
4.	100*(4-0.5)/5	70.00	40
5.	100*(5-0.5)/5	90.00	25

The average score and ranks of different preferences are depicted and results highlights the crop preferences given by oat and berseem fodder cultivators, with the lucern as the most preferred crop, ranked first with the highest mean score of 60.70. Following this, hybrid napier which was ranked second. Similarly, berseem was assigned rank III, while the oat and maize are recorded at rank IV and V, respectively. Garrett's method provides a robust quantitative approach to interpret qualitative ranking data, allowing researchers to draw meaningful insights into cultivator's

preferences. Lucern likely ranked highest among fodder crops that due to its

Table 3: Garrett score and ranking of crops given by fodder cultivators

Sr. No.	Crops	Garret score						Mean score	Rank
		I	II	III	IV	V	Total		
1.	Lucern	2400	3780	750	280	75	7285	60.708	I
2.	Hybrid Napier	975	2700	2600	320	50	6645	55.375	II
3.	Berseem	3675	180	850	840	750	6295	52.458	III
4.	Oat	1200	540	1050	1160	1125	5075	42.292	IV
5.	Maize	750	0	750	2200	1000	4700	39.167	V

superior nutritional value, especially its high protein content and digestibility, which directly benefits livestock health and milk production. Its perennial nature allows for multiple harvests annually, ensuring consistent fodder supply. Lucern also improves soil fertility through nitrogen fixation, making it both economically and environmentally sustainable. In contrast, Hybrid Napier and Berseem also which is also productive and palatable, may require more water or management, slightly lowering their preference among cultivators. Maize was likely less favoured as a fodder crop due to several practical limitations. Unlike Lucern or Hybrid Napier, maize is a seasonal crop that offers only a single harvest, reducing its year-round availability. It also has lower protein content (around 7-9%) compared to leguminous fodder crops, which affects its nutritional value for livestock.

Conclusion

The application of Garrett's ranking method in evaluating fodder crop preferences among forage cultivators reveals a clear and data-driven hierarchy of choices. Based on the calculated Garrett values and mean scores, Lucerne emerged as the most preferred crop (mean score: 60.70), followed by Hybrid Napier (55.37), Berseem (52.45), Oat (42.29), and Maize (39.16). This methodology facilitated the systematic integration of individual rank-based preferences, thereby reducing potential biases and improving the statistical robustness and reliability of the resultant findings. The results underscore Lucerne's dominance due to its high palatability and nutritional value, while the lower ranking of Maize suggests limited preference, possibly due to seasonal constraints or lower yield. Promoting awareness among farmers through Krishi Vigyan Kendra's (KVKs) and State Agricultural Universities (SAUs) about the benefits of cultivating fodder crops can significantly enhance overall agricultural productivity. These institutions serve as vital platforms for disseminating scientific knowledge, conducting on-field demonstrations, and offering hands-on training to the cultivators. By encouraging the adoption of nutrient-rich fodder crops, they help improve livestock health, increase milk production, and strengthen the overall rural economy. Hence, the Garrett Ranking method not only facilitates evidence-based decision-making in fodder cultivation but also plays a crucial role in strengthening sustainable livestock productivity and rural economic development.

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