

## COMPARATIVE EFFICACY OF DIFFERENT *RABI* FORAGE CROPS UNDER NORTH GUJARAT AGRO-CLIMATIC REGION

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### SUMMARY

The field experiments were conducted at Agroforestry Research Station, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat four years during 2012-13 to 2015-16. Significant differences were observed in green and dry fodder yield due to among the crops and their combination. Lucerne + chicory combination produced significantly higher green (95.8 t/ha) and dry fodder (14.8 t/ha) yield as compared to other treatments, but significantly tallest plant (154.6 cm) was observed in *rabi* maize. Lucerne + chicory gain higher net return (159425 Rs/ha) and B: C (6.0) ratio as compared to other crops.

**Key Words :** Dry fodder yield, fodder yield, green fodder yield and *rabi* crop

Fodder crops play an important role in agricultural economy of developing country like India. The green fodder and green fodder mixture play a great role in nutrition of ruminants. At present, animals rearing is essential for increasing milk production, on other hand, day-by-day, traditional green grasses in pasture land have been reducing gradually due to urbanization and industrialization, the demand of cultivated fodder crops are increasing due to growth of livestock sector has been much faster than the crop sectors. Moreover, the majority of animals are deplorably poor due to underfeeding and malnutrition, which is usually ascribed to fluctuating and inconsistent supply of quality fodder (Singh *et al.*, 2018).

In India, only 4.40 percent of the cultivated area is under fodder crops with annual total forage production of 846 million tonnes. Whereas, the green forage requirement is 1061 million tonnes and dry fodder is 589 million tonnes which contributes 48.72 percent of the demand only and the deficit of green fodder expected to move up 64.21 percent (759 million tonnes) in year 2020 (Anonymous, 2007). In Gujarat, the total area under forage production is 7.96 thousand hectare. The scenario from 1995 to 2010, forage production is deficit day-by-day. Without ensuring an adequate supply of fodder, the achievement of targeted growth of livestock sector in the coming year look almost impossible. Genotypic variations in forage yield have been reported for different cereals and legume crops (Ansar *et al.*, 2010). So among the many options

to overcome the shortage of forage, the best one is the determining the best fodder crops and the mixture are an important matter for producing higher fodder yield and considering economic dimension in the process.

Among the different forage crops, *rabi* forage crops *i.e.* Lucerne (*Medicago sativa* L.) is most protein rich forage crop with good ratoonability and yielding ability. It has good production potential with containing high protein, mineral and vitamin-A. Common **rabi** cereal fodder crops. *Rabi* maize (*Zea mays* L.) grown throughout the country. It is quick growing high yielding and provides palatable and nutritious forage which can be feed any stage of growth without any risk to animals. It can be fed green or dry and makes excellent silage, other cereal crops oat (*Avena sativa* L.) and barley (*Hordeum vulgare* L.) are rich in energy and provide soft and palatable fodder. Chicory leaves contain about 12.20 percent crude protein and used as nutritious green forage (herbage) for cattle.

This study was under taken to investigate the comparative production potential of green and dry fodder of the lucerne, **rabi** maize, oat, barley and combination of lucerne + chicory and economic profitability of above fodder crops in north Gujarat Agro-climatic region.

### MATERIALS AND METHODS

An experiment on ‘‘comparative efficacy of different *rabi* forage crops *i.e.* lucerne (*Medicago*

*sativa* L.), *rabi* maize (*Zea mays* L.), oat (*Avena sativa* L.), barley (*Hordeum vulgare* L.) and combination of Lucerne (*Medicago sativa* L.) + chicory (*Cichorium intybus*) under North Gujarat Agro-climatic region” was carried out at the Agroforestry Research Station, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar during *rabi* season of 2012-13 to 2015-16. The soil of experimental field was loamy sand in texture with low in organic carbon (0.30 %) and available nitrogen (175 kg/ha), medium in available phosphorus (47 kg/ha) and high in potassium (283 kg/ha) with pH value of 7.5. Total five treatments *viz.* lucerne, *rabi* maize, oat, barley and lucerne + chicory was laid out in randomized block design with four replications. The observations were recorded are plant height (cm), green forage yield (t/ha), dry fodder yield (t/ha) as per standard process. All the data were statistically analysed by applying the procedure of randomized block design suggested by Gomez and Gomez (1984) to draw a valid conclusion.

## RESULTS AND DISCUSSION

### Plant height (cm)

Plant height is a major factor contributing towards forage yield of different crops. The data presented in (Table 1 & Fig. 1) showed that different genotypes significantly affected the plant height of different crops. *Rabi* maize attained maximum plant height (154.60 cm), which was statistically higher over lucerne, oat, barely and lucerne + chicory, while the minimum plant height (45.0 cm) indicated by crop combination lucerne + chicory. The main causes of those differences in plant height are due to differences in genetic makeup of genotypes of different crops.

Significant differences among the varieties regarding plant height have also been reported by Chohan *et al.* (2004).

### Green fodder yield (t/ha)

Data on green fodder yield (t/ha) showed that green fodder yield was significantly varied due to different *rabi* crops (Table 1 & Fig. 1). Significantly higher Green fodder yield (14.80 t/ha) was observed in lucerne + chicory treatment over rest of treatments *i.e.* lucerne sole, *rabi* maize, barley and oat, followed by lucerne sole (11.10 t/ha). The main cause of those differences in green fodder were due to differences in genetic makeup of genotypes of different crops or possibly attributed to their difference in leaf area, responsible for more photosynthetic activities having high capacity to store assimilative products of photosynthesis. These results are in close conformity with the finding of Lodhi *et al.*, 2009 and Ayub *et al.*, 2011.

### Dry fodder yield (t/ha)

Statistical analysis of dry fodder yield (Table 1 & Fig. 1) revealed that lucerne + chicory treatment showed significant improvement by giving the maximum dry fodder yield (14.80 t/ha) that was statistically higher over other *rabi* crops *i.e.* sole lucerne, *rabi* maize, barley and oat. While, barley crop gave the minimum dry matter yield (3.8 t/ha). The main cause of those differences in dry fodder was due to differences in genetic makeup of genotypes of different crops. Significant variation in dry matter of oat varieties were also reported by Amanulluah *et al.*, 2004.

TABLE 1  
Comparative performance of different *rabi* crops under North Gujarat Agro-climatic region (Pooled data of 4 years)

Treatments	Plant height (cm)	Green Fodder yield (t/ha)	Green Fodder productivity (kg/ha/day)	Dry fodder yield (t/ha)	Dry fodder productivity (kg/ha/day)	Net Return (Rs./ha)	B : C ratio
T <sub>1</sub> : Lucerne (Anand -2)	47.4	56.1	260.0	11.1	51.6	129831	4.4
T <sub>2</sub> : Rabi Maize (African Tall)	154.6	28.3	336.3	5.2	61.7	40589	3.6
T <sub>3</sub> : Oat (Kent)	84.2	40.4	350.3	4.5	38.2	60088	3.9
T <sub>4</sub> : Barley (RD 2051)	69.2	34.2	294.2	3.8	32.6	47616	3.3
T <sub>5</sub> : Lucerne + Chicory (50:50 mixture)	45.0	95.8	467.3	14.8	72.3	159425	6.0
SEm ±	2.07	1.24	27.5	0.23	1.94	-	-
CD (P=0.05)	5.90	3.52	84.75	0.65	5.52	-	-
CV %	10.36	9.72	10.89	11.62	15.15	-	-
Y x T Interaction	11.79	7.05	58.45	1.30	11.40	-	-

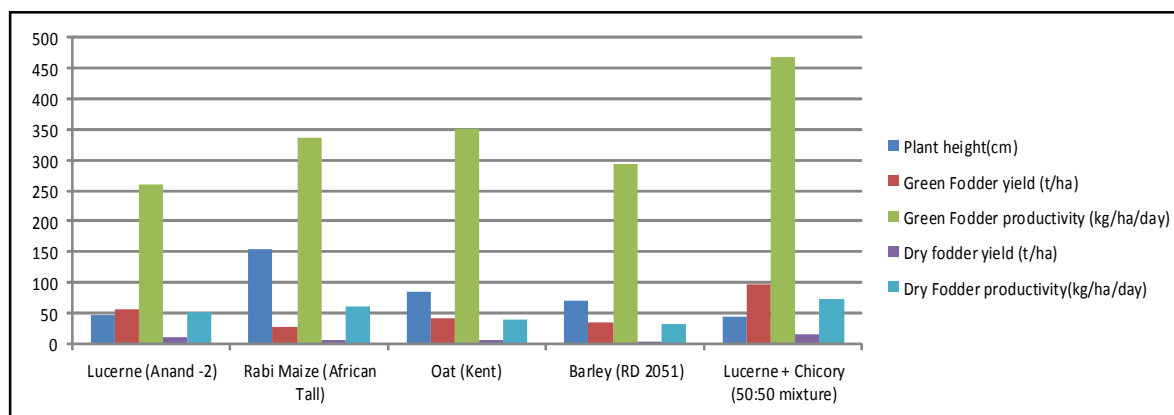


Fig. 1. Comparative performance of different rabi crops under North Gujarat Agro-climatic region (Pooled data of 4 years).

### Green and dry fodder productivity (kg/ha/day)

The data on Green and dry fodder productivity are presented in Table 1. The result showed that fodder productivity was significantly higher under Lucerne + chicory growing as compared to remaining forage crops. While, minimum productivity was found in Barley growing. This was observed due to differences in genetic makeup of genotypes of different crops.

### ECONOMICS

Among the crops and crop combination, the lucerne + chicory (50:50 seed mixture) fetch up gross income (Rs. 1,91,667 Rs/ha), net return (Rs. 1,59,425 Rs/ha) and B: C ratio (6.0) which were higher over the rest of treatments (Table 1).

### CONCLUSION

On the basis of four years pooled data, it may be concluded that lucerne + chicory (50:50 mixture) yielded higher green and dry fodder over rest of the treatments *i.e.* lucerne, *rabi* maize, oat and barley crops and it was superior in per day yield under the loamy sand soil of North Gujarat agro-climatic conditions.

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