

-n of high soil organic matter

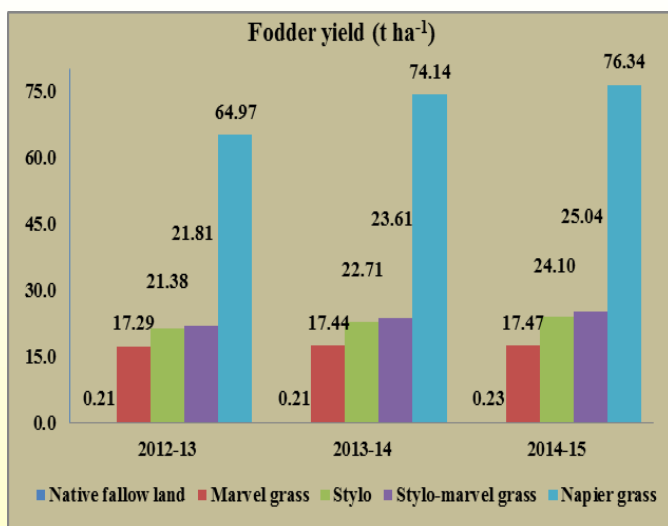
- ◆ The nitrogen content was high under napier grass about 7.2 mg kg<sup>-1</sup> over three years period of cultivation found as it was mainly attributed for high soil organic matter addition through root biomass while it was just 5.1 mg kg<sup>-1</sup> under stylo based cropping systems. The difference between marvel grass and native fallow land was almost nil as they were dated the cutting and carrying systems.

### Fodder production

- ◆ The high gravel content on the shallow basaltic gravelly land limited the fodder yield of all the crops in which the napier grass performed relatively better with a production of fodder varied from 65 to 76.3 t ha<sup>-1</sup>.
- ◆ The temporal change of fodder yield was positive and high amount was obtained from the napier grass even it was an insignificant increase. In addition to that, the root biomass production of around 3-4 t ha<sup>-1</sup> was also higher than that of other crops. High amount of nutrient and water requirements and crop vigour might be the reason for performance

of napier grass. However, the yield comparison for gravel effect has shown that the stylo and marvel grass has performed better than others for their features of drought tolerance, soil moisture conservation and biological nitrogen fixation. High gravel reduction create space for accommodation of roots that forage ability get increased with time.

- ◆ Growing these crops along with napier well be a promising source for animal dietaries ensuring the livestock sustainability in the Deccan regions.
- ◆ Over all, It is concluded that the short period cultivation of napier grass can be recommended for quick gravel disintegration and improvement soil properties besides the benefiting of high remunerative fodder yield to the farmers belonging to Central Deccan Plateau region



## Napier grass – A model Crop for Development of Shallow Basaltic Gravelly Land in the Central Deccan Plateau Region



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## Introduction

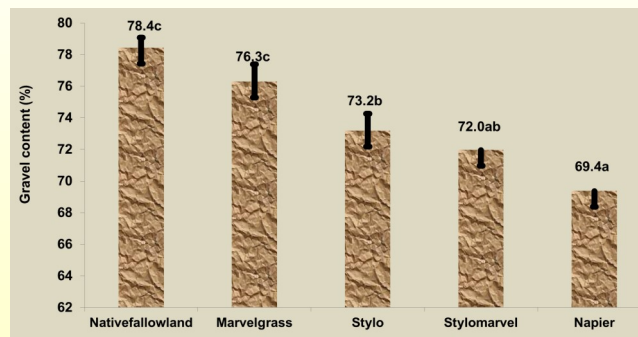
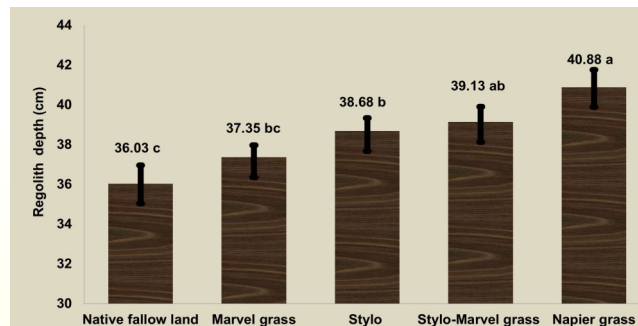
- ◆ Almost 1.5 lakhs ha of waste land in Pune district poses high amount of edaphic stresses such as shallow soil depth, high gravel content, high bulk density, low water retention and low fertility limits arable crop cultivation. The removal of gravel particles and potting of soils is a common practice even it requires a huge initial investment .
- ◆ The marginal and small land holding farmers are unable to bear the investment and leave the land as such without cultivation. At the same time, they are looking for a cost effective technology for land development while giving some economic returns.
- ◆ Vegetation plays a major role in decline of gravel content and improvement of soil content and other closely associated properties particularly on the land which are in shallow in depth, high gravel content and an early developmental stage. As the fodder crops does not required fertile land, this has potential for bringing under fodder crops cultivation.

## Gravel disintegration

- ◆ The gravel content in the shallow basaltic land of the region is mostly around 80% and increased with depth.



- ◆ The regolith depth is also a shallow of around 25-40 cm across the landscape. The soil organic carbon, nitrogen, phosphorus and potassium content are very low. The gravels are mostly composed of minerals which are a derivation of basaltic rocks. The rock materials present in the Deccan region regions are varied kind in which a significant proportion mudstone, rock which is highly susceptible to disintegration is also present. The large proportion of rock materials belongs to vesicular type poses high porosity.
- ◆ The introduction of fodder crop brought a significant decline of gravels besides some economic returns. In which, the gravels disintegration was maximum at 90 g kg<sup>-1</sup> gravels under napier grass cultivation. It was about almost 60 g kg<sup>-1</sup> for the adaptation of stylo based cropping system on the shallow basaltic gravelly land.



- ◆ The regolith depth also got increased maximum by 4.85 cm under napier while it was about 2.5 to 3 cm for stylo based cropping system and 1.3 cm under marvel grass cultivated field. It is highly related to fodder yield, root biomass and soil organic matter, bulk density reduction and available nitrogen

## Soil properties

- ◆ The bulk density (BD) stands for materials compaction resist the crop root penetration and moisture drawing ability from soils at a high value. The barren land after brought un-

Treatments	BD (Mg m <sup>-3</sup> )	SOC (g kg <sup>-1</sup> )	Potentially mineralizable soil nitrogen (kg ha <sup>-1</sup> )
Napier grass	1.98±0.04 a	0.89±0.06 a	30.91±0.06a
Stylo	2.20±0.02 b	0.57±0.04 b	23.62±0.02b
Stylo-marvel grass	2.11±0.03 c	0.63±0.05 b	24.91±0.05b
Marvel grass	2.36±0.03 c	0.39±0.03 c	17.45±0.03c
Native fallow land	2.48±0.03 d	0.33±0.02 c	14.75±0.02c

der cultivation, the BD get reduced significantly for reduction of large size particles and increase of soil moisture content.

- ◆ The decrease of BD was high about 20% under napier grass while it was about 13% under stylo based cropping systems. The soil organic carbon content (g kg<sup>-1</sup>) was also high about 2.7 times under napier grass for high root biomass contribution while it was 1.9 times under stylo based cropping systems.
- ◆ The nitrogen content was high under napier grass about 7.2 mg kg<sup>-1</sup> over three years period of cultivation. It was mainly for attributio