

PRELIMINARY STUDIES ON THE INTORUDCTION OF GUAYULE IN PAKISTAN

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Five accessions of guayule from USA namely N565, N576, 11605, 11619 and 12229 were studied at National Agricultural Research Centre, Islamabad for growth parameters i.e. plant height, number of primary branches per plant, main stem diameter and plant periphery. The plants reached a height of upto 98.8 cm, main stem diameter of upto 4.61 cm and 300 cm in periphery in three years. The differences in growth parameters except plant height among five accessions of guayule were significant.

Key words: Adaptability, Guayule, Rubber, Sodium hypochlorite.

INTRODUCTION

Guayule, *Parthenium argentatum* Gray, is a xerophytic shrub and belongs to the family Asteraceae. The species is native to Southern Texas and Northeastern Mexico where the natural vegetation is a mixture of high desert and mesquite grassland. It prefers calcareous, sandy loam and well drained soils and could tolerate a wide range of temperatures [1]. The plant is a potential source of natural rubber which is similar in properties and qualities to Hevea rubber [2]. The ecology and distribution of guayule have been described in detail elsewhere [3,4].

Guayule is mainly propagated through seeds which are known to have dormancy upto 12 months. Various treatments like light, washing and soaking of seeds in water, treatment with sodium hypochlorite or gibberellic acid have been suggested to break the seed dormancy [5,6]. Considering the importance of natural rubber, some studies were initiated to explore the adaptability of guayule plant in agro-ecological conditions of Pakistan.

MATERIALS AND METHODS

The small seed samples of five accessions of guayule, namely N565, N576, 11605, 11619 and 12229 were imported from Plant Germplasm Laboratory, Beltsville, USA. The seeds were soaked in distilled water overnight and then treated with 1.25 % sodium hypochlorite solution to break the seed dormancy [5]. The seeds were then sown in trays filled with sand, clay and farm yard manure in the ratio of 1:1:1 for raising the nursery. When the seedlings were 8 weeks old, these were transplanted on ridges in the field using augmented design at National Agricultural Research Centre (NARC), Islamabad. The Centre is located in the subtropical subhumid ecological zone. The average annual rainfall recorded at NARC is about 1100 mm, the maximum rains being received during monsoon season.

Minimum temperature seldom falls below zero during January while maximum temperature upto 45° has been recorded in June. The soils are non-saline loam with 1.22 % organic matter, 7.3 pH and 0.857 mm hos/cm electrical conductivity [7]. Plots were one row per cultivar and 20 meters in length. Every row was 1 meter apart from the adjacent one and plant to plant distance was 50 cms. Irrigation as a practice was not followed, however, the field was irrigated at the time of transplantation.

In order to assess the adaptability of this crop, observations on plant height, main stem diameter, branches per plant and plant periphery were recorded from 1986-88. The growth data are an average of 10 plants which were randomly selected for observations. Each plant was considered as one replicate.

RESULTS AND DISCUSSIONS

Table 1 shows the mean performance of five guayule cultivars for plant height, main stem diameter, primary branches per plant and plant periphery after three years of

Table 1. Mean performance of 5 Guayule cultivars for some morphological attributes at NARC, Islamabad 1986-88

Cultivars	Plant height (cm)	Main stem diameter (cm)	Branches/plant	Plant periphery (cm)
N-565	92.8	3.52b	17.2b	271ab
N-576	98.8	4.61a	21.4a	300a
11605	89.2	3.30b	17.6b	257b
11619	89.6	3.87b	19.0ab	257b
12229	91.6	3.90b	20.4ab	268b

Means within a column followed by a common letter do not differ significantly at 0.01 probability level.

their growth. Maximum plant height was recorded in accession N576, the plants attaining a height of 98.8 cm in three years. The differences among five accessions as regard plant height were non-significant (Table 2). The

Table 2. F values, SE, range, CV% and Chi-square for 4 agronomic traits in Guayule.

Characters	'F' value	SE	Range	CV%	Chi-square
Plant height(cm)	1.24ns	3.48	68-120	11.89	5.32
Main stem dia(cm)	7.43**	0.18	2.31-5.74	15.00	12.79
Branches/plant	4.40**	0.85	12-25	14.14	2.48
Plant periphery (cm)	4.81**	8.04	225-345	9.39	1.64

ns= Non significant **= Significant at 1% probability level.

maximum stem diameter, primary branches per plant and periphery were also recorded in the same accession. The differences in main stem diameter, primary branches per plant and plant periphery among the accessions were significant. The growth data reveals that accession N576 was comparatively more vigorous than the other four accessions under our agro-ecological conditions. On the basis of results obtained so far, the crop seems to be quite adaptable under our local conditions. Naqvi and Hanson [5] have reported that guayule shrub could reach a height of 1 m under favourable conditions. In our experiment, the

average plant height among five accessions was close to one meter after three years of their growth. Anyhow, during rainy seasons, few plants died of root rot because the plants are susceptible to high moisture in the soil. Beaupre and cheo [8] have also reported similar findings. With abundant semi arid and marginal lands available in the country, guayule holds promise for rubber production in Pakistan.

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Cultivar	Plant height (cm)	Main stem diameter (cm)	Branches/plant	Plant periphery (cm)
N-576	92.8	3.528	17.38	271.48
N-578	98.8	4.512	21.42	300.4
N-579	89.2	2.304	17.48	257.8
N-580	89.8	2.878	19.048	237.8
N-581	91.8	2.888	20.448	268.8

Means within a column followed by a common letter do not differ significantly at 0.01 probability level.

MATERIALS AND METHODS

The small seed samples of five accessions of guayule namely N576, N578, N579 and N580 were imported from Plant Genoplasm Laboratory, Bellville, USA. The seeds were soaked in distilled water overnight and then treated with 1.25% sodium hypochlorite solution to break the seed dormancy [2]. The seeds were then sown in trays filled with sand, clay and farm manure in the ratio of 1:1:1 for raising the nursery. When the seedlings were 8 weeks old, these were transplanted on ridges in the field using augmented design at National Agricultural Research Centre (NARC), Islamabad. The Centre is located in the subtropical subt humid ecological zone. The average annual rainfall recorded at NARC is about 1100 mm, the maximum rains being received during monsoon season.