Influence of Environmental Conditions on the Performance of Cluster Bean Genotypes

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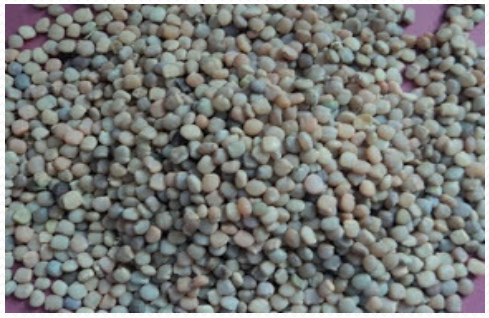
Cluster Bean *(Cyamopsis tetragonoloba L. Taub)*

India produces 10.0-12.5 lakh tons of guar and world leader in production of guar with 80% of world production
It is grown in arid zones of Rajasthan, some parts of Gujarat, Haryana, and Madhya Pradesh

Guar gum from guar seeds

- Guar gum, also called guaran, is a galactomannan
- Guar gum is an extract of the guar bean
- It is used in paper, textile, oil drilling, mining, explosives, ore flotation, and other various industrial applications



Demand Development

- **The demand of this gum is high in international market as in recent past due to its application in crude oil drilling and shell gas industry, which resulted in hike in price up to Rs. 32,000/quintal of seed**

- **The production zones are expanding to new areas where identification of suitable variety is the need of the hour**

Growth conditions of Guar

- Guar basically grown under arid rain fed conditions
- Guar grows well under a wide range of soil conditions and has good capabilities to fix atmospheric nitrogen.
- Guar tolerates high temperatures and dry conditions and is adapted to arid and semi-arid climates
- Guar is susceptible to water logging. Guar is considered to be tolerant of both soil salinity and alkalinity

Cluster Bean (*Cyamopsis tetragonoloba (L.) Taub)*

- **The present research work aimed at addressing the issues to optimize the environmental conditions *visa vis* identification of suitable varieties for different locations**
- **This will help to expand the areas of cultivation as well as improving the productivity there by enhancing the livelihood opportunities to the poor farmers**

Five genotypes of cluster bean were obtained from Rajasthan Agricultural University (RAU)

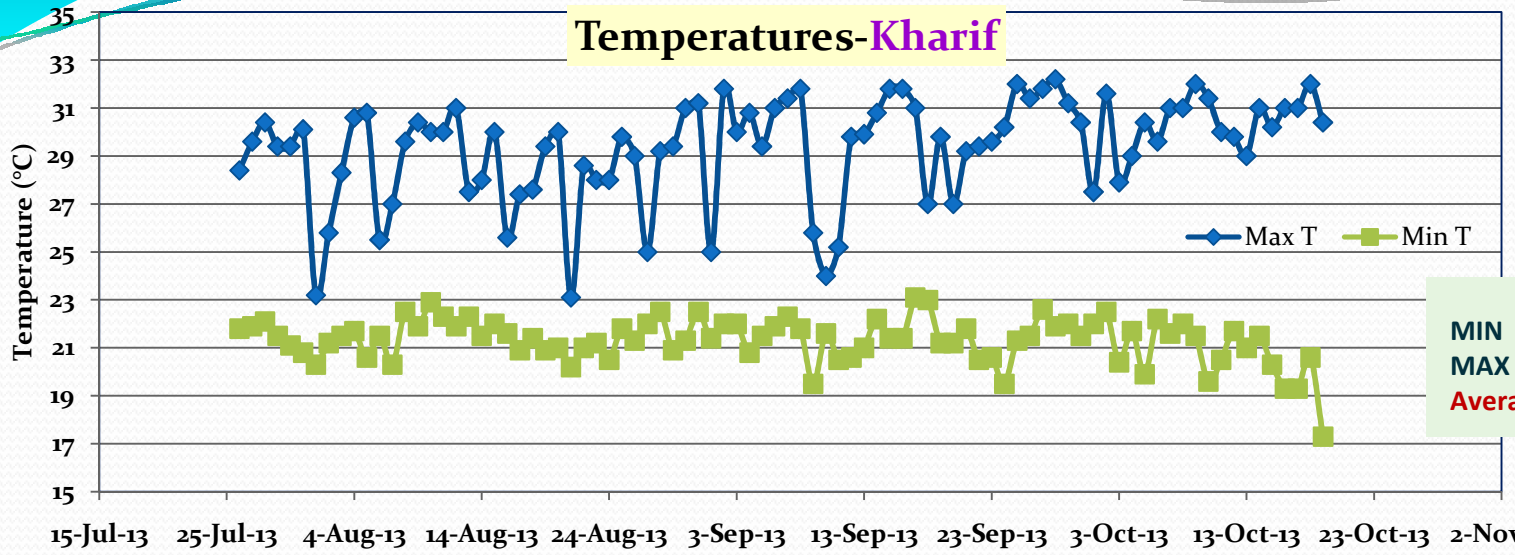
- **RGC-1017**
- **RGC-1025**
- **RGC-936**
- **RGC-986**
- **HGS- 365**

Growth conditions:

Two seasons- Summer and Kharif (rainy) season to have variable temperature, RH & photoperiod

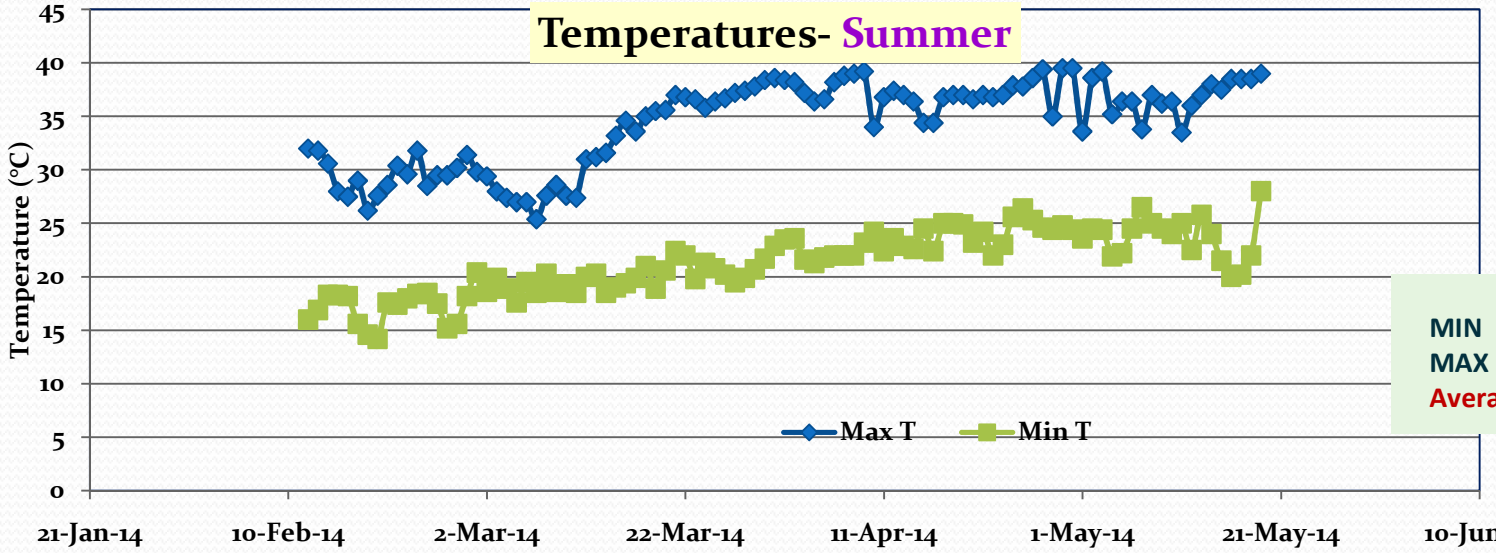
- **Rainy (Kharif) Crop- July to October 2013**
- **Summer Crop- March to June 2014**

Temperatures-Kharif

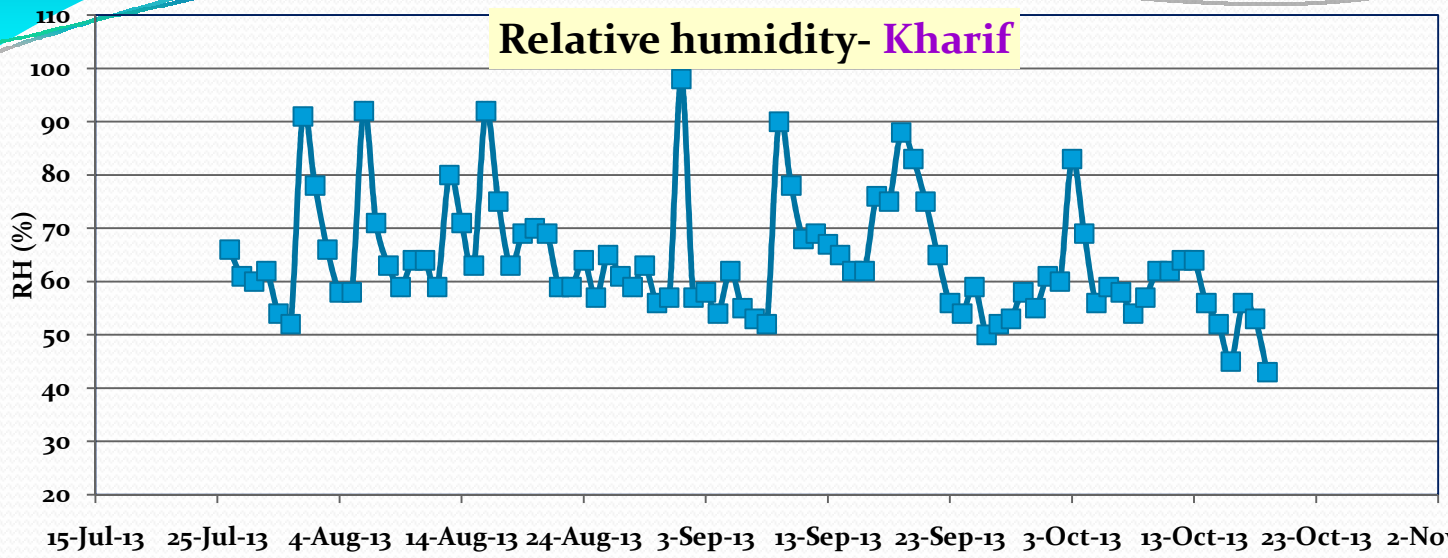


	Min T	Max T
MIN	17.3	23.1
MAX	23.1	32.2
Average	21.32	29.37

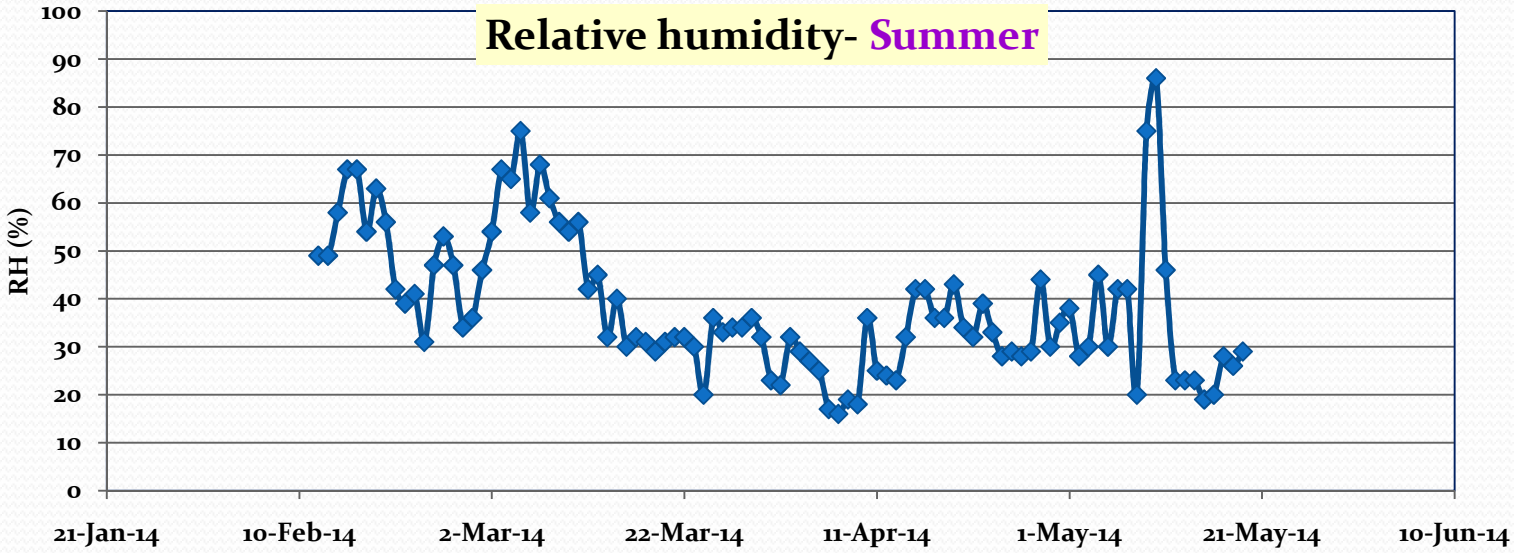
Temperatures- Summer

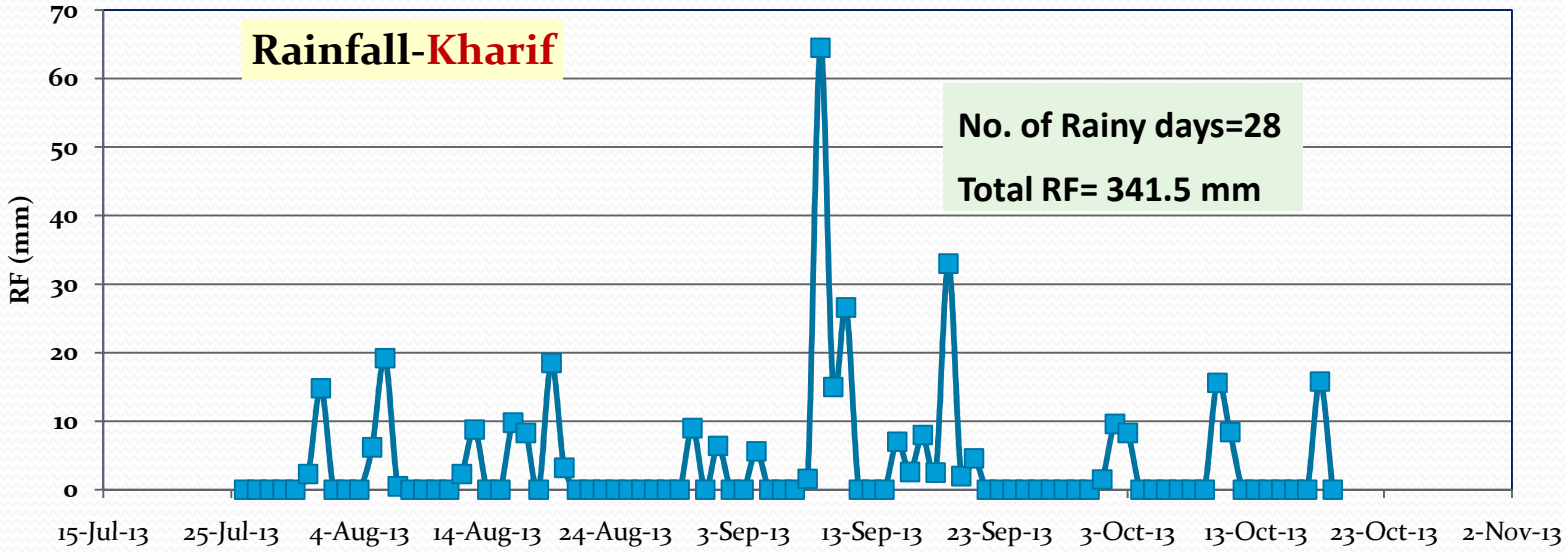


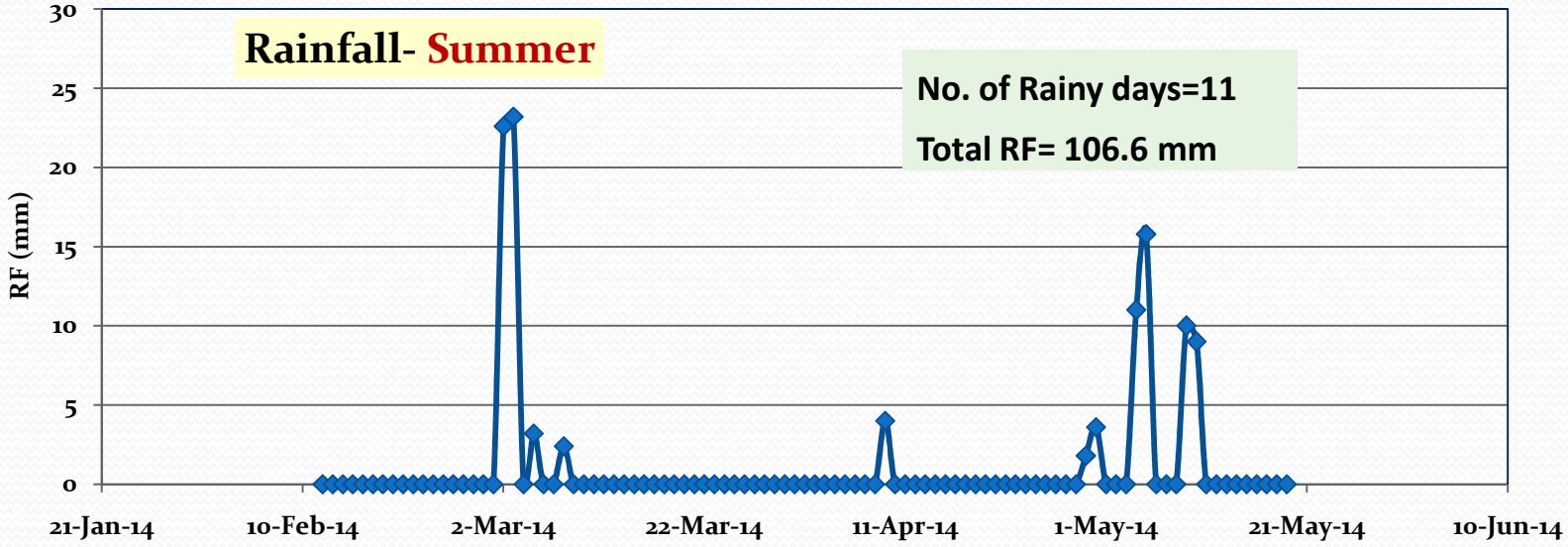
	Min T	Max T
MIN	14.2	25.4
MAX	28	39.5
Average	21.28	34.38



	Kharif	Summer
MIN	43	16
MAX	98	86
Average	63.87	38.40



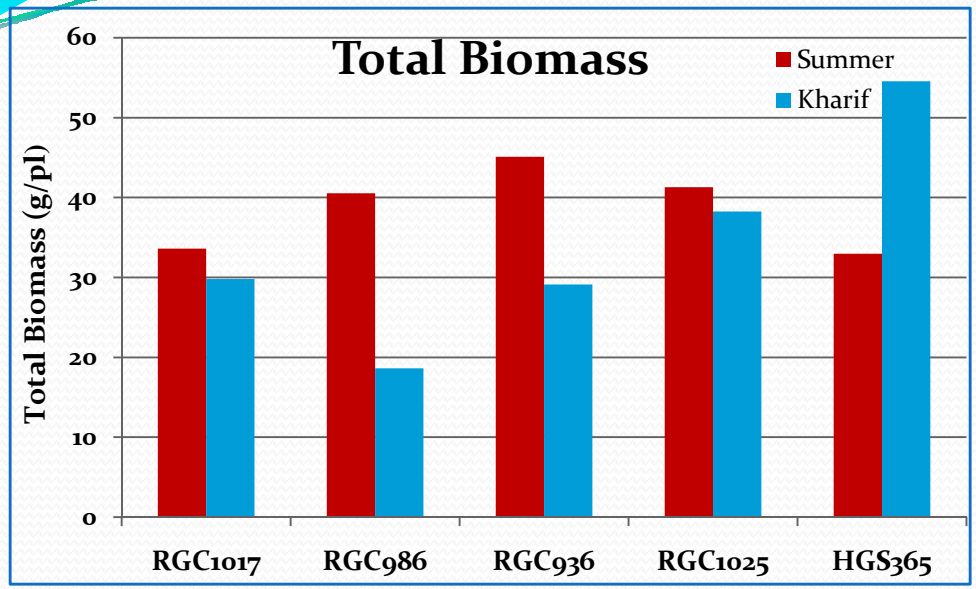

Rainfall-Kharif
No. of Rainy days=28
Total RF= 341.5 mm
RF (mm)
70
60
50
40
30
20
10
0
15-Jul-13
25-Jul-13
4-Aug-13
14-Aug-13
24-Aug-13
3-Sep-13
13-Sep-13
23-Sep-13
3-Oct-13
13-Oct-13
23-Oct-13
2-Nov-13

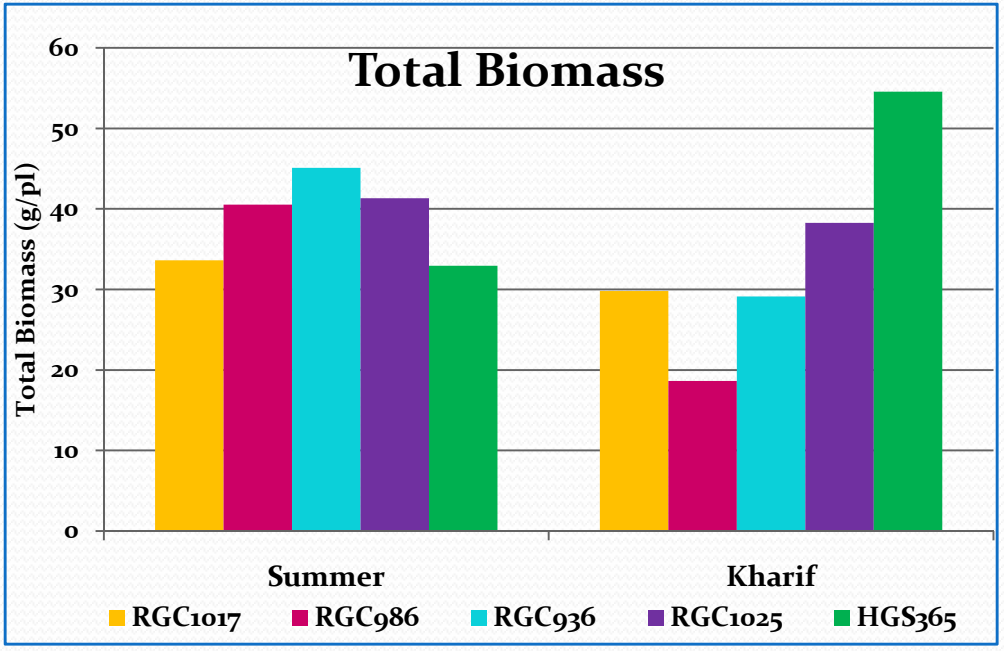

Rainfall- Summer
No. of Rainy days=11
Total RF= 106.6 mm
RF (mm)
30
25
20
15
10
5
0
21-Jan-14
10-Feb-14
2-Mar-14
22-Mar-14
11-Apr-14
1-May-14
21-May-14
10-Jun-14

Results

- **Summer Crop- March to June 2014**
- **Rainy (Kharif) Crop- July to October 2013**

Observations recorded on	
Days to 50% flowering	Root biomass
Plant height	Total biomass
No. of Branches	No. of Pods
Leaf area	Pod weight
Leaf biomass	Seed number
Stem biomass	Seed Yield
Root length	100 seed weight
Root volume	HI



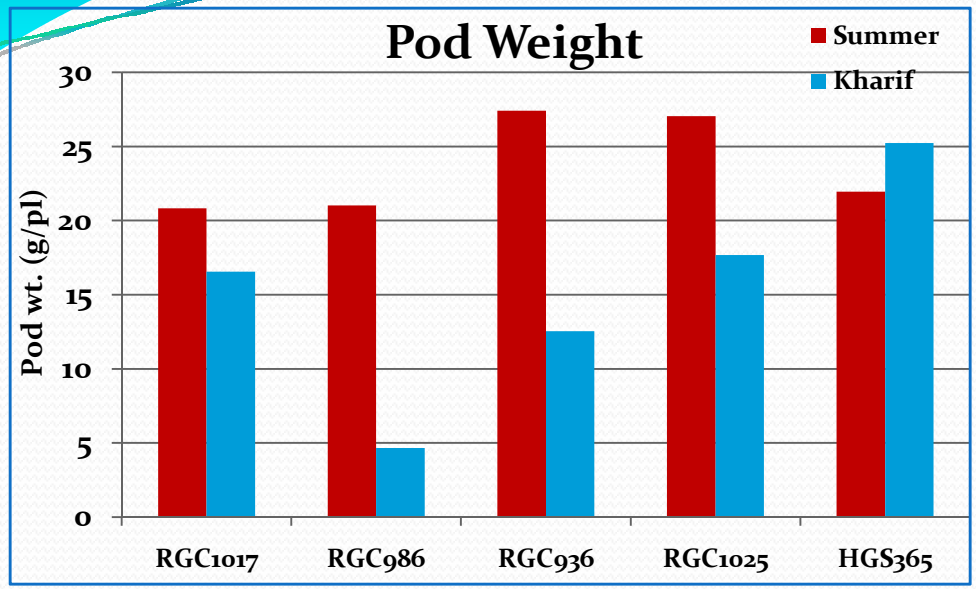


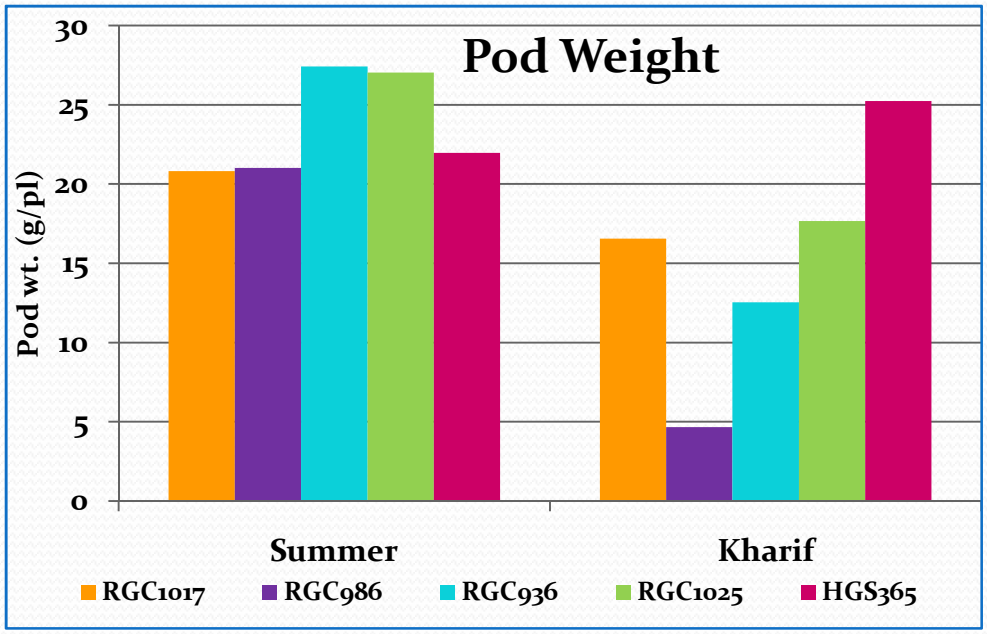
The selected genotypes varied in their response to seasons.

Majority of the genotypes produced higher biomass during summer season as compared with kharif except HGS-365

RGC 1017 and RGC 1025 registered less reduction in total biomass during kharif

Reduction was high in RGC 986 and RGC 936 during kharif



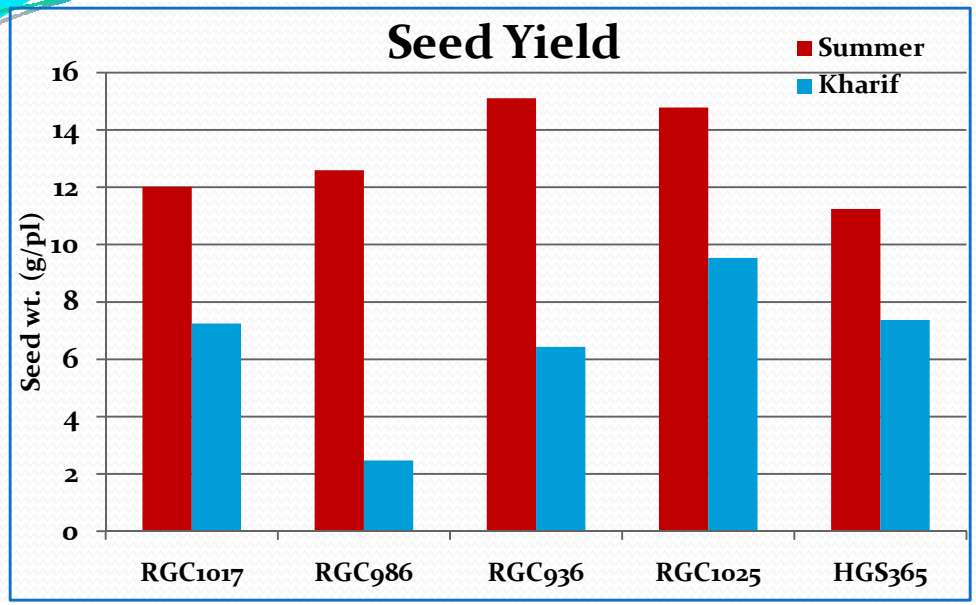


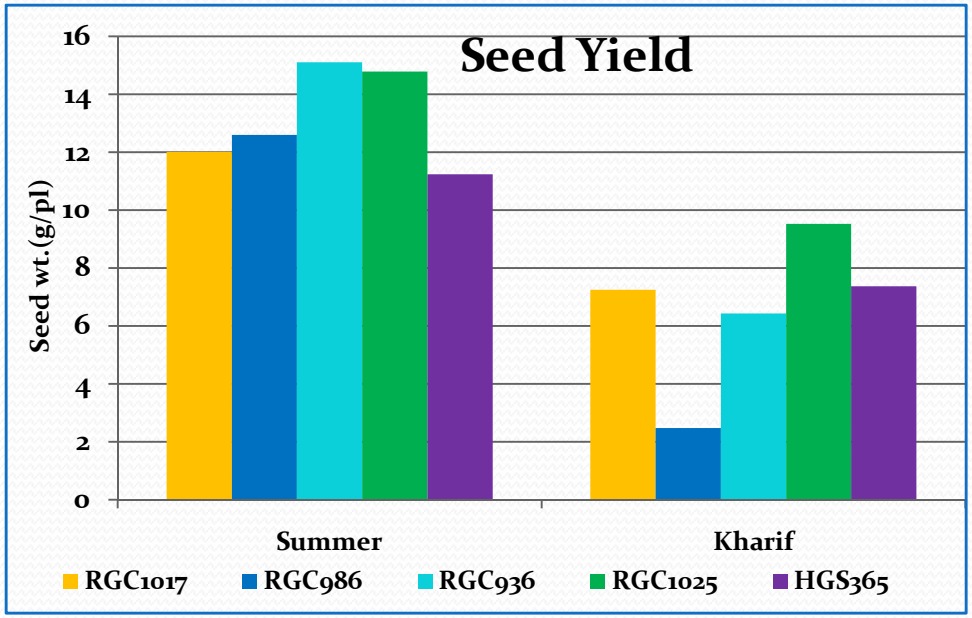
Majority of the genotypes produced more pod weight during summer season as compared with kharif.

The genotype HGS 365 produced more pod weight in kharif season than in summer and RGC986 recorded lowest pod weight

In summer season the genotypes RGC936 and RGC1025 recorded highest pod weight

During Kharif there was lot of variation in pod weight



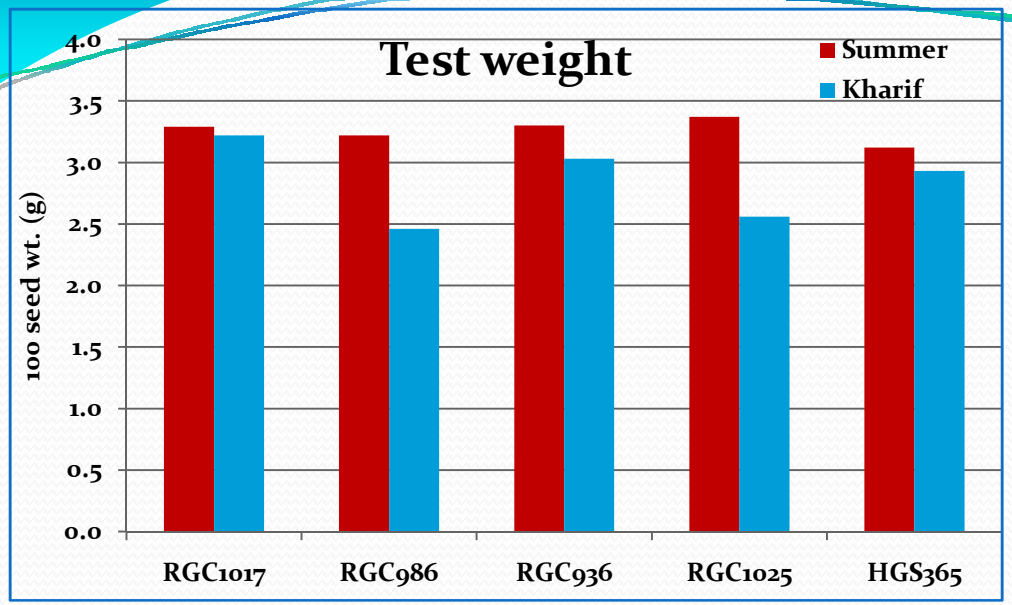


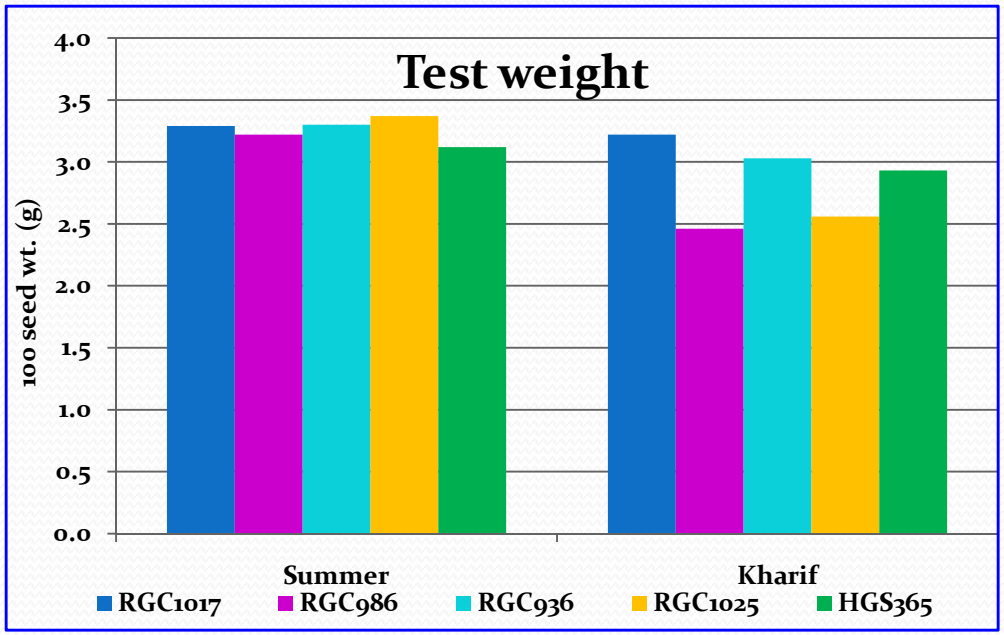
All the genotypes showed improved performance in seed weight in Summer season than Kharif

In summer, RGC 936 recorded highest seed weight (15.11 g/pl) followed by RGC1025 (14.78 g/pl)

In Kharif, RGC 1025 recorded highest seed weight (9.53 g/pl) followed by HGS 365 (7.3 g/pl)

Though HGS365 recorded improved total biomass and pod weight in kharif, its seed yield was reduced in kharif



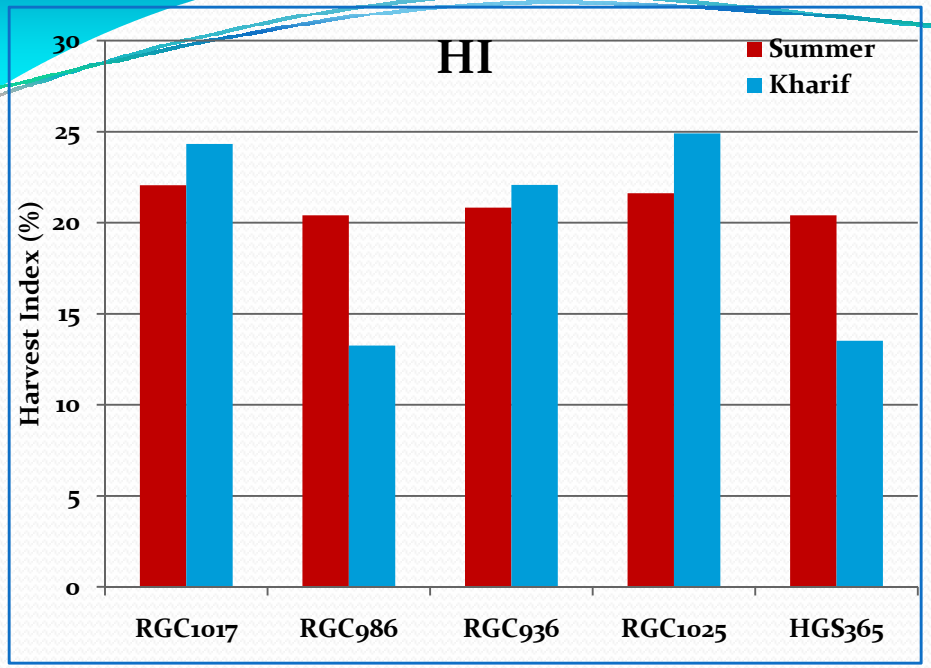


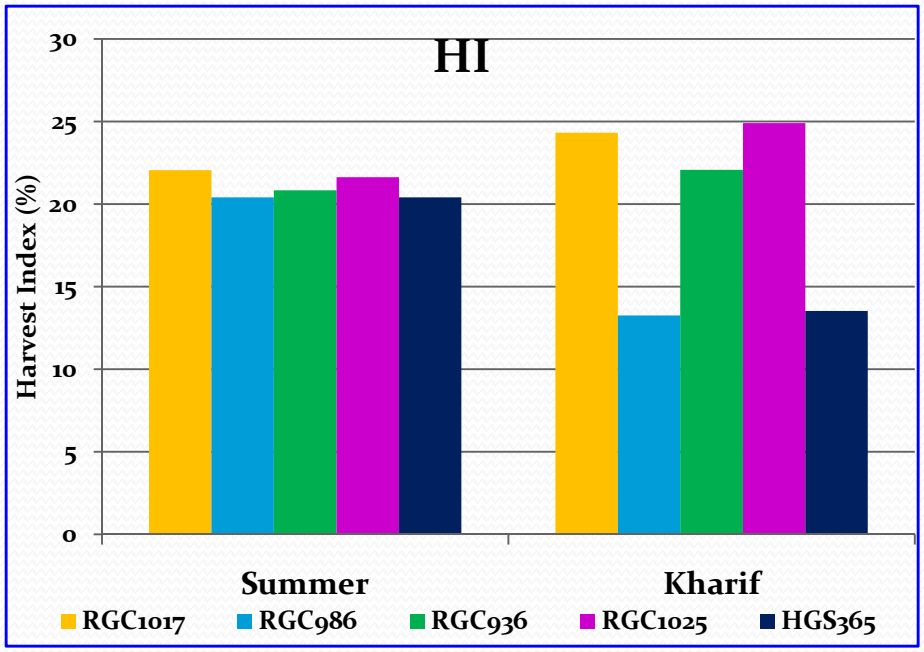
There was non significant difference for 100 seed weight during summer season

The seeds of RGC936(3.3 g) and RGC1025 (3.4 g) were bold than all the genotypes in summer season

RGC1017 and HGS365 maintained 100 seed weight in both seasons with least reduction

RGC986 and RGC1025 showed lowest test weight than the other genotypes in Kharif



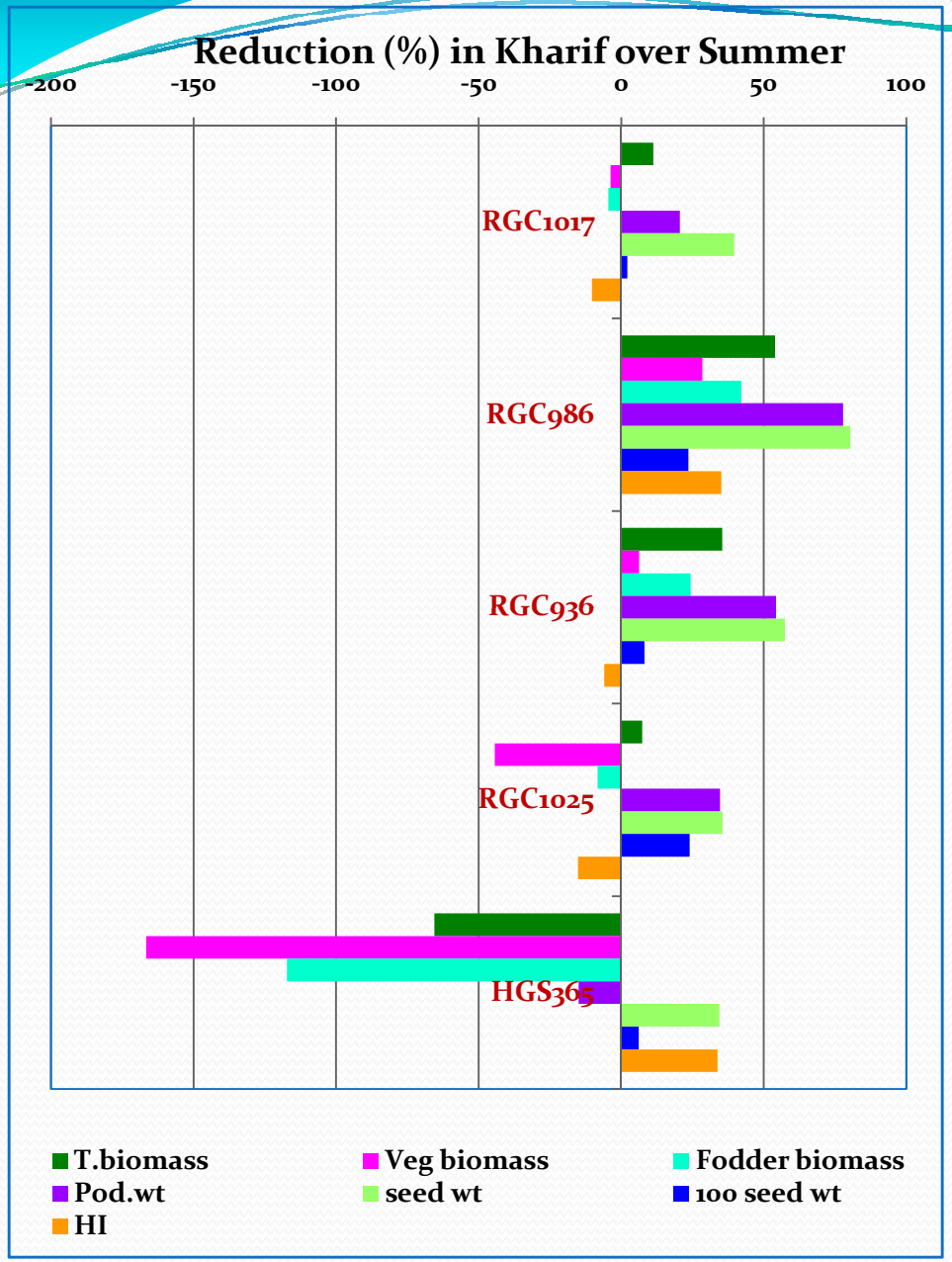


In summer season, the variation between genotypes was meager for Harvest Index, however it is significant in kharif

RGC1017, RGC936 and RGC1025 recorded better HI in kharif than summer season

RGC1017 recorded highest HI (22%) and RGC986 and HGS 365 (20%) recorded lower HI in summer season

RGC1025 recorded highest HI (25%) and RGC986 (13%) recorded lowest HI in Kharif

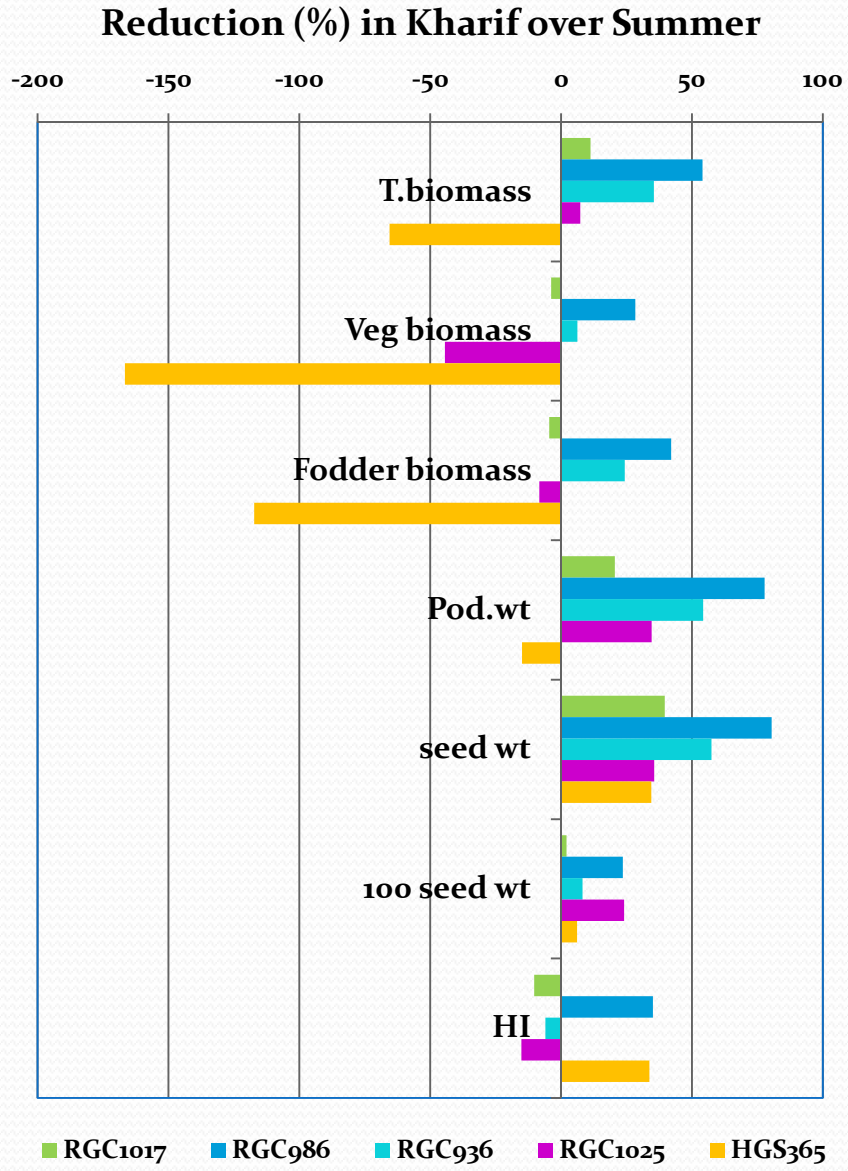


All the genotypes except HGS-365 recorded reduction in majority of the parameters in Kharif season

Kharif season was favoring the improvement in Total biomass, Vegetative biomass, Fodder biomass and pod wt. of HGS 365

All parameters of RGC986 reduced in kharif season

The impact of seasons was minimum on different parameters of RGC 1017 followed by RGC 1025



Seed weight and Test weight reduced in kharif season in all the genotypes

Total biomass, vegetative biomass, fodder biomass of HGS365 improved from 65 to 167% during Kharif than Summer season.

The reduction in pod and seed weight was higher than biomass parameters of all the genotypes except HGS365 in kharif season

The seasonal response of HI differed in different genotypes due to differential response of seed yield and total biomass of individual genotype

Conclusions

- Performance of all the selected five cluster bean genotypes reduced in kharif season as compared with summer season
- There is variation in genotype as well as parameter response to different seasons
- The reduction in yield and yield parameters was more than biomass parameters in kharif season
- The genotypes RGC 1017 and RGC 1025 maintained total biomass with better seed yield during kharif
- The genotype HGS365 with improved biomass and moderate seed yield during kharif may serve as dual purpose crop with better fodder biomass

Thank You

Any Queries are most welcomed!