CHAPTER-VI

SUMMARY AND CONCLUSION
SUMMARY

Due to heavy pressure of cropping, use of high-yielding varieties of crops and imbalanced application of nitrogen and phosphorus including non-addition of farm yard manure etc., the soil fertility is continuously deteriorating and the crop productivity is unsuitable. In the light of the fact that high-yielding varieties of Isabgol are heavy feeder and highly responsive to applied fertilizers, it would also be known from proposed work that how much Isabgol varieties would require the applied N and P fertilizers to achieve good yield response under the existing agroclimatic conditions of Vindhyan plateau of Madhya Pradesh.

Looking to the facts mentioned above, there is an urgent need to develop improved Agrotechnique specially plant densities and nutrient management to achieve maximum harvest of this crop in the region. Keeping above points in view the present investigation entitled “Evaluation of Isabgol (Plantago ovata Forsk) at different plant densities and fertility levels in Vindhyan plateau of Madhya Pradesh was undertaken.

The field experiments were conducted at Rajakhedi on the farmer’s field during rabi seasons of 1999-2000 and 2000-2001. The selected field had an uniform slope with homogeneous fertility. The soil of the experimental field falls under the order “vertisols”
(Buckman and Brady 1980) which is characterised by deep and wide cracks during summer, and swelling characteristics under wet conditions.

The soil of the experimental field was clay-loam (vertisol) having pH 7.1 and 8.70, electrical conductivity 0.27 and 0.24 mnhos/cm, organic carbon 0.53 and 0.54%, available N, P$_2$O$_5$ and K$_2$O, 470.25 and 365.00 kg, 6.4 and 6.4 kg and 459.2 and 487.12 kg/ha respectively in both the seasons. The total rainfall received during the crop season (October to March) was 100.14 mm and 32.54 mm in 1999-2000 and 2000-2001 respectively. The treatments comprised of 3 plant densities (6, 8 and 10 kg seed/ha) as the main plot treatment and 4 fertility levels (N$_0$ P$_0$, N$_{25}$ P$_{25}$, N$_{50}$ P$_{50}$ and N$_{75}$ P$_{75}$) as the sub-plot treatments. The twelve treatment combinations thus formed were laid out in split plot design keeping three replications. Isabgol var. Gujrat-2 was sown in rows 20 cm apart keeping the seed rates as per treatments. The experiment was sown on 16 November 1999 and 9 November 2000. An uniform dose of 25 kg K$_2$O/ha along with the respective nitrogen and phosphorus fertilizer treatments was applied to all the plots as basal in 20 cm apart open furrows during sowing time. Before sowing, the seeds were first treated with Thirum fungicide @ 3g/kg seed in all the treatments. The crop was grown as per recommended package of practices. Two hand weedicings were performed at 20 and 40 days after sowing to control the seasonal
weeds. One palewa and four irrigations were provided through sprinkler system of irrigation. Adequate plant protection measures were followed to protect the crop from powdery mildew and wilt diseases and from the attack of insects like aphids. For this purpose carbandazine @ 2g / liter of water and Monocrotophos @ 625 ml /ha was sprayed respectively. The crop was harvested on 18-20 march in 2000 and 2001 and finally, treatmentwise yields were recorded. Different observations on crop parameters were recorded periodically and finally at harvest in both the years. Data were tabulated and analysed statistically.

Optimum plant population per unit area is an essential component to obtain maximum production from the area. This special requirement differs from variety to variety which are coming forward for use by the Isabgol growers. The optimum plant population also varies with the agro-climatic conditions of a region.

Randhawa, et al. (1970) studied the effect of seed rate on a sandy-loam soil and concluded that the increase in seed rate from 5 to 10 kg/ha through 7.5 kg/ha gave maximum seed yield under prevailed agro-climatic conditions of Punjab. However, various trials conducted under AICARP at Anand Centre (Gujrat) suggested the optimum seed rate to be 4.0 kg/ha which is the seed rate recommended to the farmers in Gujrat state (Anonymous, 1981).
Randhawa et al. (1978) found at Punjab that the seed yield increased with the increase in nitrogen level upto 60 kg N/ha, but in another experiment, the yield response did not increase beyond 20 kg Nitrog/ha. Gupta (1982) showed at Anand that high nitrogen use over and above 25 kg/ha did not reflect the seed yield. Kalyanasundaram et al. (1984) assessed that ordinarily 25 kg N/ha and 25 kg P₂O₅/ha is required as basal dose at the last ploughing, and 25 kg N/ha as top dressing at 39 days after sowing.

Parihar and Singh (1995) conducted a field experiment at mandor (Rajasthan) and concluded that psyllium var. GI-2 responded significantly only upto 20 kg N and 20 kg P₂O₅/ha under western Rajasthan conditions.

Patel et al. (1996) from Junagarh reported that potential production and profit can be secured from Gujrat ‘Isabgol-1’ by fertilizing the crop with 20 kg each of nitrogen and phosphorus/ha under south saurashtra agro-climatic conditions. These findings were found to be close agreement with those of Randhawa et al. (1982), and Samya and Gill (1986).

Mann and Vyas (1999) found at Udaypur that application of 45 kg N/ha in Isabgol increased significantly the plant height, number of leaves/plant and dry matter accumulations.

The salient findings based on present two seasons work are summarized as below:
Vegetative growth characters

The plant height and leaf area per plant of Isabgol var. Gujrat- 2 was very fast between 30 and 60 days of plant growth. However the formation of tillers/plant was not so fast at any growth stage. In case of dry weight/plant (dry matter accumulation/plant), multifold rise was noted at every stage of growth till the maturity stage.

As regards with the applied treatments higher plant density (10 kg seed/ha) resulted in 38 plants/metre row length as against only 22 plants in case of lower plant density (6 kg seed/ha). However, different fertility levels up to N$_{75}$P$_{75}$ did not deviate the plant population.

Amongst the growth characters, except plant height number of tillers, leaf area and dry weight/plant were found to depress with the increase of seed rate at every stage of observations. This may be attributed to increase competition among the dense populated plants each other for space, light moisture and nutrients.

However, with the increase of fertility levels up to N$_{75}$ P$_{75}$ increased all these growth parameters almost significantly at every stage of growth. In this respect leaf area played a major role where solar energy gets' converted into chemical energy during photosynthesis.
Yield attributing characters

The factors which are directly responsible for seed production viz number of earheads, length of earheads, seeds/earhead 1000 seed weight of Isabgol were declined considerably due to increased plant densities i.e. from 6 kg to 10 kg seed rate/ha.

These yield attributing characters of Gujrat Isabgol-2 except 1000- seed weight were, enhanced almost significantly due to increased supply of nitrogen and phosphorus from N25P25 to N75P75. A seed rate of 6 kg/ha along with N75P75 further enhanced these parameters.

Productivity and Economics

A fertility dose of N50P50 enhanced the seed yield of isabgol significantly up to 18.88 q/ha with the net return up to Rs. 25262/ha. Further increase in fertilizer dose up to N75P75 did not increase the seed yield which indicated that N50P50 fertility level would be the optimum dose under the existing N and P status of the field soil. The total increase in seed yield was up to 1.06 and 5.35 q/ha i.e. 7.83 and 39.54% due to N25P25 and N50P50 fertility levels over N0P0 (Control) respectively. The corresponding increase in straw yield was 2.97 q/ha (11.25%) and 8.99 q/ha (34.05%) due to N25P25 and N50P50 respectively. The harvest index was found slightly higher with N50P50 fertility level. This was more pronounced at higher seed rate (6 kg/ha).
The lowest plant density (6 kg seed /ha) produced maximum seed yield up to 18.54 q/ha and net return up to Rs. 25232./ha. Further increase in the plant densities i.e. up to 8 and 10 kg seed/ha. The seed yield was decreased drastically. Thus, it is evident that 6 kg seed rate /ha is the most suitable input for the existing agroclimatic conditions of vindhyan plateau of Madhya Pradesh.

Although the treatment interactions were not significant a seed rate of 6 kg/ha along with N50P50 fertility level appears to be the most optimum inputs for maximum seed production of Gujrat-2 variety of Isabgol. Due to this combination the seed yield went up to 20.38 - 22.97 q/ha in both the years with the net return up to Rs. 29262 to Rs. 34443/ha. Because this interaction resulted in further enhancement of seed yield as compared to that of their separate effects therefore it may be considered for the Isabgol recommendation to the growers of the Vindhyan plateau.

CONCLUSION

Gujrat Isabgol-2 grown under a lower plant density of 6 kg seed/ha along with the medium fertility of 50 kg N and 50 kg P2O5/ha proved the most optimum and remunerative to the Isabgol growers of Vindhyan plateau of Madhya Pradesh.