

## Planting ratio for hybrid seed production in maize

Single cross: 4:2

Double cross: 6:2

3 way cross: 6:2

Border rows: a. Inbreds & single cross - 4 rows

b. Others - 3 rows

The number of border rows to be planted all around the seed field to modify isolation distance less than 200 m shall also be determined by the size of the field and its distance from the contaminant as shown below.

Area in ha.	Isolation distance (m)	Border rows
< 4 ha	200	1
< 4 ha	150	5
< 4 ha	100	9
< 4 ha	50	13
10-12 ha	180	1
10-12 ha	130	5
10-12 ha	80	9
10-12 ha	30	13
> 16 ha	165	1
> 16 ha	115	5
> 16 ha	65	9
> 16 ha	15	13

## Planting ratio for hybrid seed production in rice (CGMS system)

### Staggered sowing of parents for synchronization

As the seed set on CMS line depends on cross pollination it is most important to synchronize the heading date of the male and female parents, especially for the hybrid combinations having parents with quite different growth duration.

In addition, in order to extend the pollen supply time, the male parent is usually seeded twice or thrice at an interval of 4-5 days.

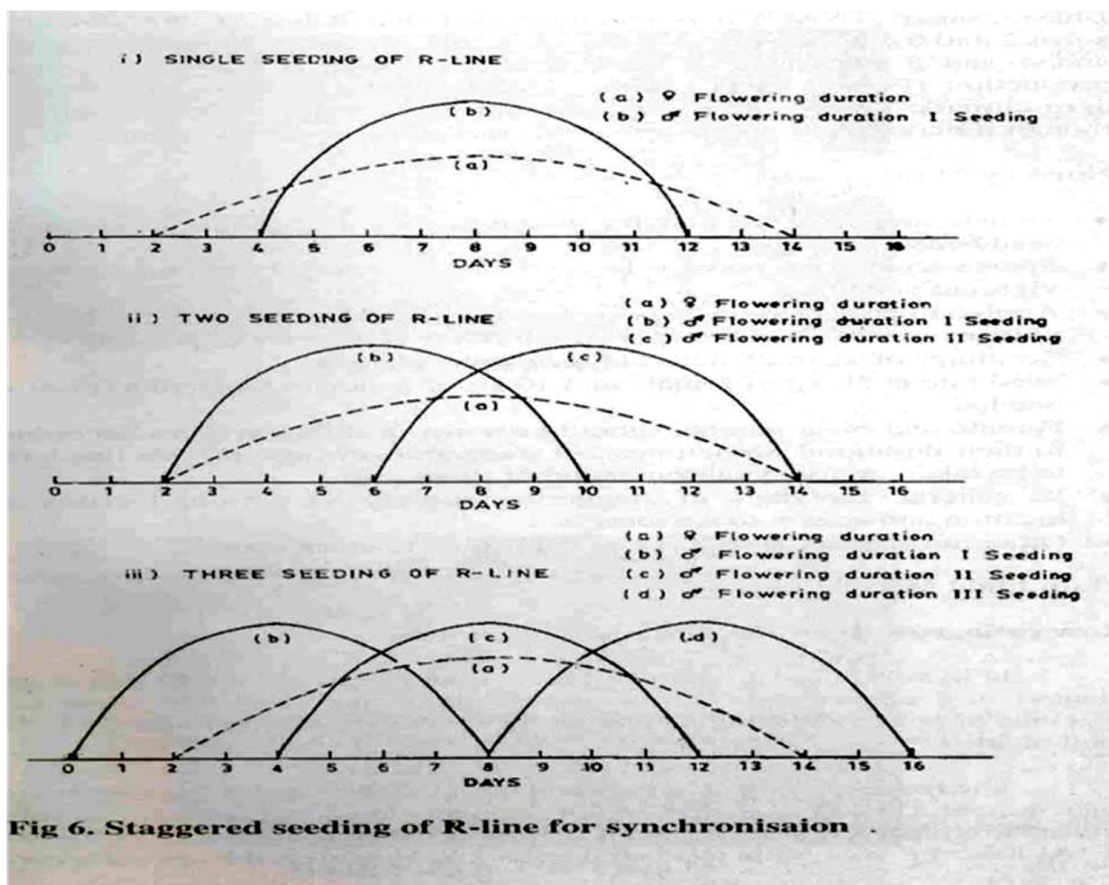
The following 3 methods can be used to determine the differences in seedlings date for synchronization between male and female parents.

- Growth Duration Difference (GDD) method
- Leaf Number Difference (LND) method
- Effective Accumulated Temperature (EAT) method

Among these 3 methods though the LND method is more reliable one, the GDD method is mostly followed since it is rather simple and easy to adopt. In GDD method by checking the previous data on the difference in duration from seedling to heading between male and female parents, the proper seeding date of both parents in current season can be determined. This method is suitable in seasons or regions where the temperature fluctuation is small.

**Staggered seeding of R line for synchronization.**

- Single seeding of R line
- Two seeding of R line
- 3 seeding of R line.



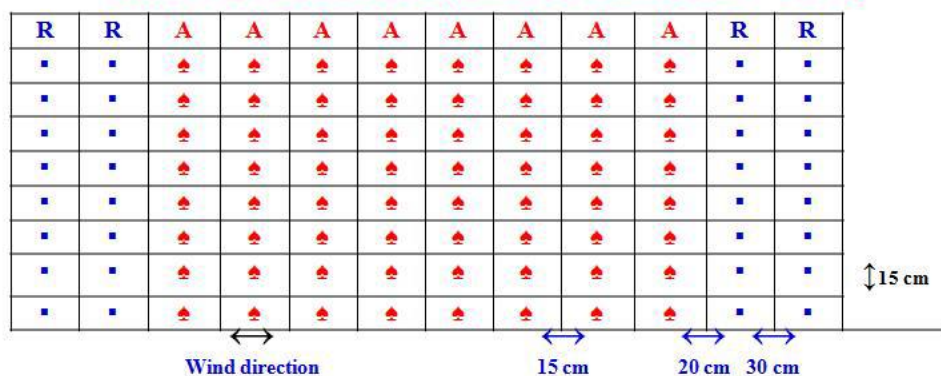
**Fig 6. Staggered seeding of R-line for synchronisaion .**

**Row ratio: 8:2 or 10:2**

### Transplanting in a specific row ratio and row direction:

In hybrid rice seed production, the seed parent and pollen parent are planted in a certain row ratio at certain spacing (Figure 8; scheme1). The row ratio and spacing of pollen parent and seed parent have a distinct effect on the hybrid seed yields. The row ratio or row proportion refers to the number of rows of the male parent (R line) to that of the female parent (A line) in a seed production plot. Suppose if we plant 2 rows of 'R' line followed by 8 rows of 'A', the row ratio can be taken as 2:8. In hybrid rice seed production plot, 2:8 row ratio is reasonable. However, the row ratio may vary from region to region, depending on weather, management and parental lines. R and A lines can be planted in several row ratios of 2:6-14 for hybrid seed production but for maintaining the CMS line, it should not exceed 2:6-8. To encourage out-crossing, the rows of male and female in the seed production plot should be perpendicular to the prevailing wind direction expected at flowering time of the parents.

#### Scheme 1: Row Ratio, Row Direction and Planting Pattern for Hybrid Rice Seed Production (Male : Female ratio = 2 : 8)



### 6.3. Transplanting of the R line

- Transplant the seedlings of R line in paired rows
- Leave a space of 115-145 cms inside block between paired rows of 'R' line seedlings for transplanting 6-8 row blocks of 'A' line seedlings.
- Transplant 2-3 seedlings per hill with a row-to-row distance of 30 cms and plant-to-plant spacing of 15 cms.

### 6.4. Transplanting of CMS line (A line)

- Transplant 'A' line seedlings in blocks of 8 rows in between the paired rows of 'R' lines
- Transplant with 1-2 seedlings per hill at a spacing of 15 x 15 cms
- Always keep 20 cm wide space between A line rows and nearest R line row.