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Influence of sowing date on seasonal incidence of eriophyid mite *(Aceria cajani)* and sterility mosaic disease in redgram *(Cajanus cajan* l.) LRG-52

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Abstract
Sterility mosaic disease (SMD), which is transmitted by the eriophyid mite *Aceria cajani*, is a major problem in cultivation of redgram (*Cajanus cajan* L.) which causes yield reduction. A field study at S.V. Agricultural College, Tirupati, Andhra Pradesh, during *kharif* and *rabi* 2025-26 evaluated four sowing dates (22 June, 7 July, 22 July, 7 August 2025) in variety LRG-52 (Amaravati), for their effect on mite build-up, SMD incidence and yield. Mite population and disease incidence were highest, and yield lowest, in the earliest-sown crop; the 22 July sowing recorded the lowest mite population and disease incidence and the highest yield (1,850 kg ha^{-1}). Results establish a clear inverse relationship between vector/disease pressure and yield, and identify late-July sowing as an effective cultural tactic to reduce SMD losses.

Keywords: *Cajanus cajan*, *Aceria cajani*, sterility mosaic disease, sowing date, redgram, yield

Introduction
Redgram (*Cajanus cajan* L.) is a drought tolerant crop, also know as pigeonpea, tur and arhar (Hindi), congo bean (English), *etc.,* It is mainly cultivated in the regions of tropical and subtropical regions of the world. In most of Asian countries including India it serves as major source of protein (27.70 g/ 100g of seeds). Apart from human consumption, it is also used as forage, feed, and meal for animals, piggery and fishery (Sammer Kumar *et al*., 2017). The crop is attacked by over 200 species of insect pests (Reed and Lateef, 1990). Among all the insects and pests, eriophyid mite (*Aceria cajani*) which is responsible for transmitting the, sterility mosaic disease (SMD) which is a major disease in redgram responsible for high yield loss.
Symptoms of SMD includes leaf mosaic, mottling, stunting, and reduced leaf (Mediga *et al*., 2024). The disease (SMD) is commonly referred to as the "green plague" of pigeonpea because infected plants exhibit profuse vegetative growth, remain green at flowering, and fail to produce flowers or pods (Jones *et al*., 2004). Yield losses due to sterility mosaic disease (SMD) at vegetative stage causes 26–97% yield loss, depending on the severity of infection and the proportion of affected branches per plant (Kannaiyan *et al*., 1984). Early sowing enhanced both mite population and virus transmission (Lakshmikantha *et al*., 1997) this study evaluates four staggered sowing dates for their influence on eriophyid mite incidence, SMD and yield of redgram in variety LRG-52 at Tirupati.

Materials and Methods
An experiment was conducted at the dryland farm of S.V. Agricultural College, Tirupati (13.624°N, 79.368°E), Andhra Pradesh, during *kharif* and *rabi,* 2025-26. Redgram variety LRG-52 (Amaravathi) was sown on four dates, 22 June, 7 July, 22 July and 7 August 2025, each in a 6 m × 5 m plot (90 cm × 20 cm spacing; 150 plants/plot).
The data on mite population was recorded at weekly intervals from the date of sympotms observed on the selected plant. The infected leaves were collected in a small zip lock cover, and the mite counts were recorded by marking five random spots on five terminal trifoliate leaves per plant, by observing under a stereo zoom binocular microscope (at 30×).The mite count were taken and expressed as no. of mites per each trifoliate leaves leaves/plant. The per cent SMD incidence was calculated with following formula,

$$\text{Per cent disease incidence (SMD)} = \frac{\text{Number of infected plants}}{\text{Total number of plants observed}} X100$$

And graded on the 1–3–5–7 scale of Reddy *et al.* (1990) (Table 1).

Table 1: SMD rating scale (Reddy *et al*., 1990)

Scale	Incidence	Symptom
1	0%	No symptom
3	0.1–20.0%	Symptom on fewer plants
5	20.1–50.0%	Ring spot / mild mosaic, partial sterility
7	≥50.1%	Severe mosaic, near-complete sterility

Results and Discussion
1. Seasonal Incidence of Eriophyid Mite
In the first-sown crop (22 June), mite population ranged from 1.4 to 14.4/5 trifoliate leaves/plant, first appearing in the 43rd SMW and peaking at 14.4 in the 52nd SMW before declining to 8.2 by the 6th SMW; the overall mean was 5.78, the highest among all date (Table 2).
In the second-sown crop (7 July), population ranged from 0.4 to 10.8, first appearing in the 35th SMW and peaking at 10.8 in the 3rd SMW, and declining to 6.4 by the 6th SMW, the overall mean was 4.75 (Table 2)
In the third-sown crop (22 July), population ranged from 0.4 to 6.6, first appearing in the 35th SMW and peaking at 6.6 in the 3rd SMW, declining to 5.0 by the 6th SMW, the overall mean was 3.78, the lowest among all dates (Table 2).
In the fourth-sown crop (7 August), population ranged from 0.6 to 12.6, first appearing in the 37th SMW and peaking at 12.6 in the 2nd SMW, declining to 6.8 by the 6th SMW, the overall mean was 4.23 (Table 2).

2. Effect of Sowing Date on Mite Population

The highest mean population (5.78) on the first sowing date was statistically on par with the second date (4.75), but both differed significantly from the third (3.78) and fourth (4.23) sowings (Table 2). These trends agree with Lakshmikantha *et al*., (1997), who reported peak SMD incidence in May–June-sown pigeonpea in Karnataka due to higher vector activity, and also broadly consistent with Patil *et al*., (2024), who recorded eriophyid mite build-up peaking around the 42nd SMW at Rahuri, Maharashtra.

3. Per Cent Disease Incidence of SMD

The crop sown during the 22 June sowing (First sowing) recorded the highest sterility mosaic disease incidence of 36% (Table 3). (Falling in the 20.1–50.0% 'ring spot/partial sterility' category, (Table 1). The 22 July sowing recorded the lowest incidence (8.6%), followed by 7 August (11.3%) and 7 July (14.6%), all within the 0.1–20.0% 'symptom on fewer plants' category (Table 1).

4. Effect of Sowing Date on Yield

The highest yield (1,850 kg ha^{-1}) was recorded in the third-sown crop (22 July), followed by the fourth sowing (1,710 kg ha^{-1}), the second sowing (1,286 kg ha^{-1}), and the lowest in the first sowing (793 kg ha^{-1}). This confirms that pigeonpea sterility mosaic disease, transmitted by the eriophyid mite, is the principal contributor to yield loss relative to other sucking pests of redgram.

Table 2: Seasonal incidence of eriophyid mite (*A. cajani*) on redgram (LRG-52) during *kharif* and *Rabi*, 2025-26 mean no. of mites/5 trifoliate leaves/plant

SMW	First sowing (22 June)	Second sowing (7 July)	Third sowing (22 July)	Fourth sowing (7 August)
35	0.0	1.4	0.4	0.0
36	0.0	1.6	0.4	0.0
37	0.0	1.2	0.6	0.6
38	0.0	0.6	0.6	0.8
39	0.0	1.2	1.2	0.6
40	0.0	1.0	0.0	0.0
41	0.0	0.4	0.0	0.0
42	0.0	0.6	1.0	0.0
43	1.4	2.0	1.6	0.0
44	1.2	3.6	1.8	2.0
45	2.2	4.8	3.0	2.0
46	3.4	6.4	4.6	3.8
47	4.6	6.6	2.8	3.2
48	7.6	3.8	7.4	7.0
49	9.8	7.6	7.6	6.4
50	11.2	10.2	6.6	8.0
51	10.2	6.0	6.0	7.2
52	14.4	7.6	5.6	5.6
1	12.6	7.2	8.0	6.6
2	16.0	8.2	6.2	12.6
3	14.0	10.8	5.2	10.2
4	12.4	7.0	9.0	8.4
5	9.6	7.8	6.2	9.8
6	8.2	6.4	5.0	6.8
Mean	5.78 ^{a}	4.75 ^{a}	3.78 ^{b}	4.23 ^{b}
SE(m)±	0.375			
SE(d)±	0.531			
CD (p=0.05)	1.062			

Table 3: Per cent disease incidence of SMD and yield by sowing date

Date of sowing	Plants affected (/150)	Disease incidence (%)	Yield (kg/30 sq m)	Yield (kg ha^{-1})
22 June 2025	54	36.0	2.38	793
07 July 2025	22	14.6	3.86	1,286
22 July 2025	13	8.6	5.55	1,850
07 August 2025	17	11.3	5.13	1,710

The consistent inverse relationship between mite population/SMD incidence and yield across all four dates confirms that vector pressure, rather than other sucking pests, is the principal driver of yield loss in this system, and that delaying sowing to late July avoids the peak vector-activity window associated with early crop establishment.

Conclusion

Sowing date significantly influenced eriophyid mite build-up, SMD incidence and yield in redgram cv. LRG-52. Early sowing (22 June) coincided with peak vector pressure and the lowest yield, while sowing delayed to 22 July minimised mite and disease incidence and maximised yield (1,850 kg ha^{-1}). Adjusting sowing time to late July offers a practical, non-chemical component of integrated SMD management in Rayalaseema-type agro-climates.

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