



**Effect on mungbean cultivars (*Vigna radiata* L. cv. IC280489,
EC397142, IC76415, IC333090, IC507340, IC121316, C119005, IC73401,
IC488526, IC325853)**

The net impact of individual and combined stress on plant growth

Crop: Mungbean (*Vigna radiata* L. cv IC280489,
EC397142, IC76415, IC333090, IC507340,
IC121316, C119005, IC73401, IC488526,
IC325853)
Stress 1: Phosphorus deficiency
Stress 2: Drought (10% reduction in soil moisture)
Stage of plant: 15 days after germination

The table shows the impact of phosphorus deficiency and drought alone and in combination on growth and physiology of mungbean cultivars.

| | Treatment | Plant response to stress (reduction over control %) | | | | Plant response to stress (reduction over control %) | |
|----------|---|--|-----------------------|----------------------|---------------|--|---------------|
| | | Type A parameters* | | | | Type B parameters* | |
| | | Total biomass | Number of pods/ plant | Number of seeds/ pod | Harvest index | Photosynthesis | Transpiration |
| IC333090 | Phosphorus deficiency | 7.0↓ | 6.9↓ | -5.7↑ | 7.4↓ | 7.2↓ | 9.9↓ |
| | Drought | 18.6↓ | 11.7↓ | 4.3↓ | 9.6↓ | 39.5↓ | 62.0↓ |
| | Phosphorus deficiency + Drought (20 days later (Sequential stress)) | 18.6↓ | 22.1↓ | 7.1↓ | 23.7↓ | 79.6↓ | 91.5↓ |
| IC507340 | Phosphorus deficiency | 20.9↓ | 17.5↓ | -25.8↑ | -2.4 | 11.4↓ | 8.9↓ |
| | Drought | 20.9↓ | 1.5↓ | -13.5↑ | 13.6↓ | 76.4↓ | 80.0↓ |
| | Phosphorus deficiency + Drought (20 days later (Sequential stress)) | 21.8↓ | 25.5↓ | -27.4↑ | 17.1↓ | 80.7↓ | 86.7↓ |
| IC73401 | Phosphorus deficiency | 14.7↓ | 22.6↓ | -18.3↑ | 22.9↓ | 4.7↓ | 13.1↓ |
| | Drought | 25.9↓ | 28.9↓ | -0.6↑ | 15.1↓ | 89.9↓ | 75.4↓ |

| | | | | | | | |
|----------|---|-------|-------|--------|-------|-------|-------|
| | Phosphorus deficiency + Drought (20 days later (Sequential stress)) | 45.7↓ | 40.9↓ | 2.8↓ | 15.1↓ | 93.2↓ | 95.1↓ |
| IC121316 | Phosphorus deficiency | 20.7↓ | 6.5↓ | -25.4↑ | 6.3↓ | 20.6↓ | 19.5↓ |
| | Drought | 30.4↓ | 32.6↓ | 19.0↓ | 14.4↓ | 53.4↓ | 65.9↓ |
| | Phosphorus deficiency + Drought (20 days later (Sequential stress)) | 40.1↓ | 19.6↓ | 17.5↓ | 35.9↓ | 58.8↓ | 68.3↓ |
| IC76415 | Phosphorus deficiency | 15.9↓ | 17.2↓ | 11.9↓ | 31.9↓ | 8.1↓ | 17.2↓ |
| | Drought | 31.9↓ | 26.2↓ | -8.5↑ | 14.9↓ | 61.8↓ | 70.7↓ |
| | Phosphorus deficiency + Drought (20 days later (Sequential stress)) | 37.7↓ | 35.2↓ | -11.9↑ | 14.9↓ | 72.4↓ | 77.6↓ |
| IC280489 | Phosphorus deficiency | 26.0↓ | 11.9↓ | 30.6↓ | 8.1↓ | 31.7↓ | 20.0↓ |
| | Drought | 36.3↓ | 20.2↓ | 38.4↓ | 0.0 | 51.4↓ | 53.8↓ |
| | Phosphorus deficiency + Drought (20 days later (Sequential stress)) | 48.4↓ | 52.4↓ | 48.4↓ | 20.8↓ | 98.6↓ | 89.2↓ |
| EC397142 | Phosphorus deficiency | 14.8↓ | 29.6↓ | 19.1↓ | 33.6↓ | 23.9↓ | 16.7↓ |
| | Drought | 29.3↓ | 34.0↓ | 20.6↓ | 31.4↓ | 57.1↓ | 68.1↓ |
| | Phosphorus deficiency + Drought (20 days later (Sequential stress)) | 37.6↓ | 52.2↓ | 29.4↓ | 26.5↓ | 95.7↓ | 95.8↓ |
| IC119005 | Phosphorus deficiency | 32.3↓ | 31.7↓ | 15.0↓ | 25.1↓ | 27.6↓ | 16.7↓ |
| | Drought | 28.3↓ | 39.8↓ | 29.9↓ | 47.1↓ | 89.4↓ | 90.9↓ |

| | | | | | | | |
|----------|---|-------|-------|--------|-------|-------|-------|
| | Phosphorus deficiency + Drought (20 days later (Sequential stress)) | 38.4↓ | 54.0↓ | 41.3↓ | 50.0↓ | 95.9↓ | 90.9↓ |
| IC325853 | Phosphorus deficiency | 28.2↓ | 24.1↓ | -14.8↑ | 12.4↓ | 27.8↓ | 17.5↓ |
| | Drought | 28.2↓ | 29.6↓ | -17.0↑ | 47.6↓ | 50.8↓ | 73.0↓ |
| | Phosphorus deficiency + Drought (20 days later (Sequential stress)) | 53.7↓ | 52.8↓ | -9.8↑ | 33.2↓ | 96.0↓ | 97.3↓ |
| IC488526 | Phosphorus deficiency | 33.0↓ | 52.2↓ | 27.8↓ | 15.8↓ | 23.6↓ | 31.3↓ |
| | Drought | 50.6↓ | 47.8↓ | 45.8↓ | 48.1↓ | 96.5↓ | 87.5↓ |
| | Phosphorus deficiency + Drought (20 days later (Sequential stress)) | 68.1↓ | 45.1↓ | 55.6↓ | 76.8↓ | 97.2↓ | 89.2↓ |

Reference – Meena SK, Pandey R, Sharma S, Gayacharan, Kumar T, Singh MP, Dikshit HK (2021) Physiological Basis of Combined Stress Tolerance to Low Phosphorus and Drought in a Diverse Set of Mungbean Germplasm. *Agronomy* 11(1):99.

Note: Values presented in the table were calculated using the formula described below.

$$\text{Reduction over control (\%)} = \frac{(\text{Value Control} - \text{Value Stress})}{\text{Value Control}} \times 100$$

1) ↓'- indicates plant parameters affected by stress that lead to high susceptibility (higher the value more the damage).

2) ↑' - indicates plant parameters less/not affected by stress leading to improved resistance (higher the value lesser the damage).

*' - For more information on parameter classification, please refer to the 'methodology' tab.

Inference from the study: Meena et.al. 2021 studied the interaction of phosphorus deficiency and drought in ten mungbean IC280489, EC397142, IC76415, IC333090, IC507340, IC121316, C119005, IC73401, IC488526, IC325853 cultivars. Plants were subjected to single and sequential stress of phosphorus deficiency and drought. Total biomass, number of pods/plant, number of seeds/pot, photosynthesis and transpiration was reduced synergistically under combined stress conditions for all cultivars. **Thus, this stress combination is detrimental to mungbean cultivars.**