

Herbicide damage guide for cotton

Photographs & material by:

Graham Charles
NSW Dept. Primary Industries

Herbicide: 2,4-D amine + picloram
Rate: 150 g + 37.5 g a.i./ha
% of typical field rate 50%
Date of exposure: 13th Jan
(12 weeks post-emergence)
Growth stage at exposure: 17 nodes

<u>Damage key:</u>	
Leaf loss	
Leaf distortion	x
Petiole distortion	x
Plant stunting	x
Square shedding	
Boll shedding	x

Herbicidal action

Herbicide group: I

2,4-D

Translocation: readily moves to the plant growth points
Mode of action: an auxin-type (phenoxy) herbicide that affects cell wall plasticity & nucleic acid metabolism. Low concentrations cause uncontrolled cell division & growth, leading to plant death.

Residual activity: limited

Soil half-life: 10 days in moist soil

picloram

Translocation: readily absorbed by roots and foliage and moves to the growing points

Mode of action: an auxin-type herbicide

Residual activity: strong residual activity and readily absorbed by plant roots

Soil half-life: 90 days, but can be up to 200 days. Breakdown is slower in dry, cool conditions.



Tordon 75D (2,4-D amine + picloram) applied broadcast at 500 ml/ha to 17 node cotton. Photo taken on 19th Jan, 6 days after exposure.

Mild plant distortion, with some petiole twisting and leaf mis-orientation was apparent soon after the exposure. Some leaf scorching was also apparent 6 days after exposure, with reddish patches on some upper leaves.



Tordon 75D (2,4-D amine + picloram) applied broadcast at 500 ml/ha to 17 node cotton. Photo taken on 10th Feb, 33 days after exposure.

Terminal damage with petiole reddening and twisting and leaf mis-orientation became more apparent with time. Some leaves had been lost and no new growth had emerged from the plant terminals 33 days after exposure.



Tordon 75D (2,4-D amine + picloram) applied broadcast at 500 ml/ha to 17 node cotton. Photo taken on 11th Mar, 62 days after exposure.

Highly distorted new growth was developing from the terminals of some plants, but most plants had not resumed growth. Normal growth was emerging from the lower lateral branches. The distorted leaves were a narrow wedge shape, ending in multiple narrow fingers. The leaf surface was lightly blistered and leathery in appearance.

Impact on plant growth

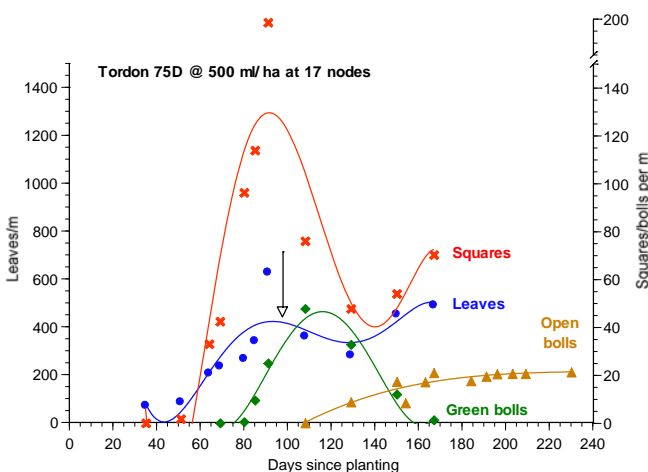
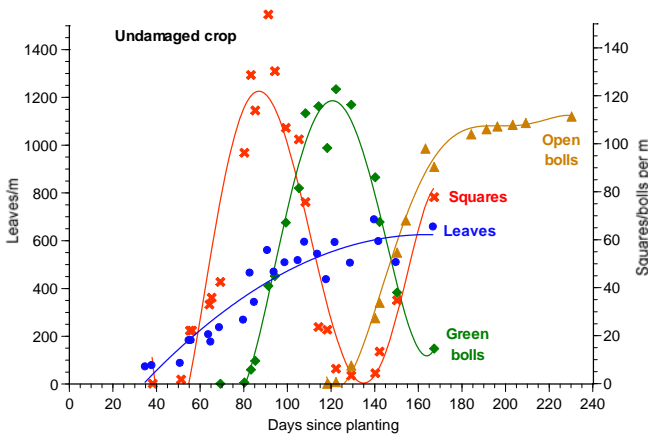
Plants: exposure to the 50% rate of 2,4-D + picloram at 17 nodes caused extensive damage to the leaves and terminals which continued for more than 60 days post-exposure. Plants were 10.5 nodes and 47 cm shorter at picking.

Leaves: plants had 25% fewer leaves and 61% less leaf area at the final observation.

Squares: plants produced a flush of late squares to compensate for lost bolls.

Bolls: the herbicide exposure caused the shedding of many young bolls; very few bolls were retained and developed following the herbicide. Only 21 mature bolls/m were present at picking. These bolls were mainly on nodes 7 – 12, with most on nodes 8 and 9. The final boll count was reduced by 52% and boll weight was down by 58%. Crop maturity was delayed by more than 80 days.

Lint: the herbicide damaged the developing bolls and reduced seed size, increasing ginning turnout to 55%. Lint yield was reduced by 82%.



Final plant count data		
	undamaged crop	2,4-D + picloram
Nodes/plant	30.9	20.4
Leaves/m*	656	490
Leaf area (cm²/m)*	21196	8330
Reduction in leaf area*		61%
Bolls/m	132	64
Boll weight (g/open boll)	5.3	2.2
Retention in posit's 1-3[^]	95%	96%
Nodes carrying >80% bolls[#]	7 - 18	8 - 12
Days to 50% open bolls	157	>237
Maturity delay (days)		>80
% Open bolls at picking	85%	33%
Lint yield/ha	2380	434

Exposure to 50% of a typical field rate of 2,4-D + picloram at 17 nodes caused major damage to the leaves and terminals. The damage resulted in the loss of nearly all bolls, with almost no bolls retained on the top 18 nodes. Some new bolls were retained on the lower branches, but these bolls were very late and small, resulting in a long delay in crop maturity. Every aspect of plant growth and development was affected. Lint yield was down 82%.

Note* Leaf number and leaf area were last recorded 167 days after planting.

Note[^] Percentage of retained bolls in positions 1-3

Note[#] The spread of nodes carrying more than 80% of open bolls.