

Herbicide damage guide for cotton

Photographs & material by:

Graham Charles
NSW Dept. Primary Industries

Herbicide: 2,4-D amine + picloram
Rate: 30 g + 7.5 g a.i./ha
% of typical field rate 10%
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	
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 100 ml/ha to 17 node cotton. Photo taken on 19th Jan, 6 days after exposure.

Mild plant distortion, with some petiole reddening and twisting and leaf misorientation was apparent soon after the exposure. Leaf yellowing was also apparent on newly expanding leaves 6 days after exposure.



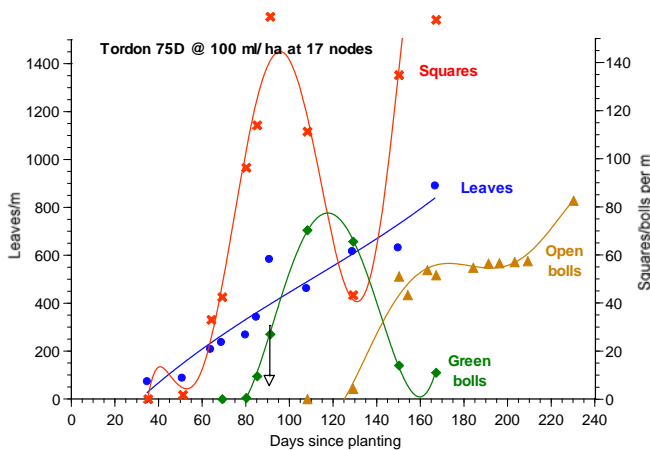
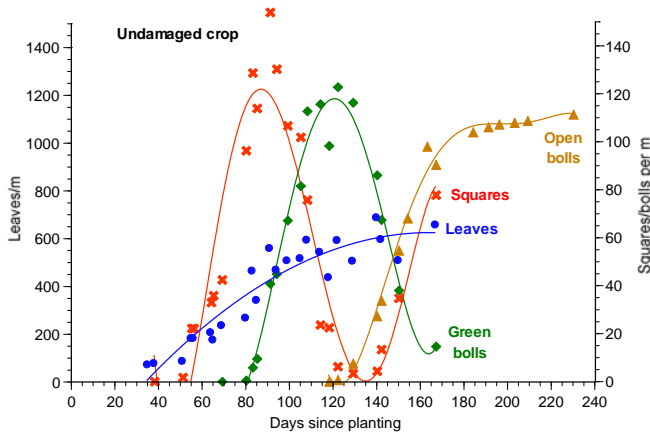
Tordon 75D (2,4-D amine + picloram) applied broadcast at 100 ml/ha to 17 node cotton. Photo taken on 10th Feb, 33 days after exposure.

Mild leaf distortion was apparent on leaves which had emerged since the herbicide exposure. New leaves were cupped with crinkled edges. There was also yellowish or reddish discoloration on the leaf edges of the damaged leaves 33 days after exposure.



Tordon 75D (2,4-D amine + picloram) applied broadcast at 100 ml/ha to 17 node cotton. Photo taken on 11th Mar, 62 days after exposure.

Highly distorted growth was obvious at the tops of the damaged plants, fringed by normal growth emerging from lateral branches. The distorted leaves were cupped with crinkled edges or tending towards 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 10% rate of 2,4-D + picloram at 17 nodes damaged the plants, causing extensive leaf damage which continued for more than 60 days post-exposure. Plants were 6 cm and 16% smaller by weight at the last observations.

Leaves: a flush of late vegetative growth resulted in 68% more leaves and 17% more leaf area at the final observation.

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

Bolls: many young bolls were shed following the herbicide exposure and few new bolls developed until late in the season. Consequently, few bolls were retained above node 13, with a scattering of bolls from nodes 22 – 27. The final boll load was equal to that of the undamaged crop, but the open bolls were 13% lighter, there was a 52 day delay in crop maturity and only 61% of bolls were open at picking.

Lint: the herbicide damaged the developing seeds, reducing seed size and increasing ginning turnout. Lint yield was down 51%.

Final plant count data

	undamaged crop	2,4-D + picloram
Nodes/plant	30.9	30.7
Leaves/m*	656	1102
Leaf area (cm²/m)*	21196	24787
Reduction in leaf area*		-
Bolls/m	132	136
Boll weight (g/open boll)	5.3	4.6
Retention in posit's 1-3[^]	95%	87%
Nodes carrying >80% bolls[#]	7 - 18	6 - 20
Days to 50% open bolls	157	209
Maturity delay (days)		52
% Open bolls at picking	85%	61%
Lint yield/ha	2380	1168

Exposure to 10% of a typical field rate of 2,4-D + picloram at 17 nodes caused only mild initial leaf damage, but damage became more pronounced later in crop life.

The damage caused the loss of many early and mid-season bolls. The plants compensated with a late flush of bolls, but there was a 52 day delay in crop maturity and many of these bolls were small and not mature at picking. Lint yield was reduced by 51%.

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.