



Defoliating Drought-Stressed Cotton

EXTENSION

October 2022

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Oklahoma Cooperative Extension Fact Sheets
are also available on our website at:
extension.okstate.edu

The primary goals of harvest aids in cotton are defoliation and boll opening. Much of the success of harvest aid applications is determined by the season-long environmental conditions, as these influence plant growth and development, as well as the conditions in the days surrounding the harvest aid application. Environmental challenges such as drought impact fruit retention and development, crop maturity and the condition of the vegetative parts of the plants. Water stress inhibits leaf expansion while also resulting in a thicker waxy cuticle on the leaf's surface compared to leaves not exposed to drought. High temperatures can compound these negative impacts, particularly when the crop is exposed to high temperatures and water stress for several consecutive weeks.

It is well known that drought stressed leaves are more difficult to defoliate than lush, healthy green leaves, as the impacts of drought stress reduce the leaves' absorption of defoliants. While other factors such as air temperature or plant stature can be addressed by adjustments to rates, products or additives, there is generally little advice or guidance included on harvest aid labels regarding drought stress, other than stating defoliation activity will be slowed or inhibited. However, there are some things that should be considered when making harvest aid decisions on drought-stressed cotton.

- **Product selection:** Defoliants are typically considered either hormonal or herbicidal, although ultimately all primarily rely on a hormonal response to achieve defoliation. The protoporphyrinogen oxidase (PPO) class of defoliants will typically be more effective on stressed foliage due to the more harsh or aggressive herbicidal activity and are less temperature sensitive than the milder herbicidal or hormonal products.
- **Increased defoliant rates:** Increasing rates of defoliants may result in increased efficacy, however, exceeding maximum label rates will not provide any additional effectiveness and is unlikely to speed up leaf drop. It is also key to stay within labeled ranges to avoid desiccating foliage resulting in leaf stick. Because drought events reduce yield potential, the increased input cost associated with higher product rates may not be a financially viable option.

- **Increased adjuvant rates:** Several cotton defoliants, specifically PPOs, require the inclusion of crop oil, non-ionic surfactant or methylated seed oil, while there is an option to include an adjuvant on the label of other products to address specific crop or environmental conditions. Similar to the product itself, increasing the adjuvant rate beyond the label recommendation is not beneficial and could result in crop injury and leaf stick.
- **Weather conditions:** Defoliants perform the best in warm, sunny conditions. Daytime temperatures need to be considered before increasing rates as crop injury potential from both defoliants and adjuvants potential increases under in hot temperatures (sustained highs >80's).
- **Carrier volume:** One of the most effective ways to improve defoliation efficacy is increasing carrier volume. Maintaining a minimum of 10 GPA has shown to improve performance and accelerate defoliation activity. Recommendations of 12.5 – 15 GPA are common, with higher carrier volumes beneficial for larger or more immature plants. Using diesel fuel as a carrier instead of water is an option to improve performance on stressed foliage for some products but is likely cost-prohibitive in most cases.

For a full description of factors that impact harvest aids, as well as descriptions and considerations for the various products, refer to the Oklahoma Cotton Harvest Aid Guide.

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Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

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- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
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- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President for Agricultural Programs and has been prepared and distributed at a cost of 20 cents per copy. 10/2022 KG.