Mid Season Hail Damage to Corn

Mid-Season Hail-Damaged Corn

Mid- to late-season hail storms can be damaging to corn because:

- The growing point can be damaged.
- Leaf area can be reduced through shredding and stripping.
- Stalks and ears can be bruised by hail stones.
- Wounds can open the plant up for fungal disease development.
- The plant population can be reduced.

The effect on yield potential is dependent on the severity of each of these factors. After V6 growth stage (6 exposed leaf collars), direct hits on the growing point, now above the soil surface, can damage or kill the growing point. Ear initiation begins in the growing point; therefore, direct hits by large hail stones can damage immature ears and ultimately result in lower yield potential.

Yield Loss Estimation

Estimating the potential yield loss from mid- to late-season hail damage can be challenging. Evaluations should not be made until 5 to 7 days after the storm to allow for new growth and any recovery. Replanting severely-damaged, mid-season fields is generally not an option because the remaining growing season will be too short for a replanted crop to reach maturity. The USDA Federal Crop Insurance Corporation (FCIC) uses information based on the number of corn leaves with tips pointing toward the ground to determine growth stage. The traditional growth stage method counts leaves once the leaf collar is visible. The FCIC method of counting can result in the plants having two or more leaves than the leaf collar method if evaluations are necessary before tassels emerge. Plant defoliation results in the loss of photosynthetic leaf area. The severity of the loss depends on the amount of leaf area removed and the plant's growth stage (Figure 1, 2, and 3). Shredded leaves can still photosynthesize; therefore, appearance can be misleading. Table 1 shows the estimated loss of yield potential for 20, 40, 60, 80, and 100% defoliation based on the FCIC leaf count method. Note that the estimated yield loss increases by leaf stage until tasseling and then begins to decline after tasseling.

Figure 1. Leaf stripping resulting from a hail event.

Figure 2. Damaged corn plants from hail.

Figure 3. Stalk breakage and bruising from hail.

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Table 1. Estimated potential corn yield loss from plant defoliation. Corn growth stage based on 'indicator leaf' method, where a leaf is considered fully developed when the leaf tip points to the ground (not a fully developed collar).

Corn Growth Stage	Percent Leaf Area Destroyed				
	20	40	60	80	100
	Percentage Potential Yield Loss				
7 leaf	0	1	4	6	9
8 leaf	0	1	5	7	11
9 leaf	0	2	6	9	13
10 leaf	0	4	8	11	16
11 leaf	1	5	9	14	22
12 leaf	1	5	11	18	28
13 leaf	1	6	13	22	34
14 leaf	2	8	17	28	44
15 leaf	2	9	20	34	51
16 leaf	3	11	23	40	61
17 leaf	4	13	28	48	72
18 leaf	5	15	33	56	84
19-21 leaf	6	18	38	64	96
Tassel	7	21	42	68	100
Silked	7	20	39	65	97
Brown silk	6	18	36	60	90
Pre-blister	5	16	32	54	81
Blister	5	16	30	50	73
Early milk	4	14	28	45	66
Milk	3	12	24	41	59
Late milk	3	10	21	35	50
Soft dough	2	8	17	29	41
Early dent	1	5	13	23	32
Dent	0	4	10	17	23
Late dent	0	3	7	11	15
Nearly mature	0	0	3	6	8
Mature	0	0	0	0	0

Source: Corn loss adjustment standards handbook. 2019 and succeeding crop years. 2018. FCIC-25080. USDA Federal Crop Insurance Corporation.

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Stand counts can provide an estimate of viable plants per acre. If the hail is severe (Figure 2 and 3), plant populations may be dramatically reduced. Defoliation should be accounted for when taking stand counts to help provide a reasonable yield estimate.

Stalk bruising can create an avenue for infection, which has the potential to cause stalk lodging later in the season (Figure 3 and 4). Continuous scouting should be conducted to evaluate stalk strength. Fields that appear to be losing stalk strength should be scheduled for an early harvest.

Direct hail hits on developing ears can cause milky kernels to break open and be destroyed (Figures 5, 6, and 7). Additionally, the sugars and starch exuding from the damaged kernels becomes a medium for fungal growth and insects to feed upon, which can result in damage to other kernels.

Fungicide Use

Fungicides, such as Delaro® 325 SC fungicide, proactively applied before a hail event may help reduce stress caused by foliar diseases. Wet, humid conditions common during and after a hail event are conducive for the development of many fungal corn diseases. Common foliar corn diseases such as gray leaf spot, northern corn leaf blight, and rusts do not infect through wounds and can be managed with a fungicide. Diseases such as Goss's wilt, common smut, and stalk rots infect through wounds, and are not controlled by fungicides.[1] However, a fungicide application applied shortly before or after a hail event can help lower disease incidence from wounded leaves. The strobilurin component of Delaro fungicide increases the formation of callus tissue which helps heal wounded plants, creating a barrier which can reduce the potential for pathogens to enter damaged plant tissue and could enhance the recovery of the plant and help preserve its productivity. An application may also be warranted should fungicide-controllable diseases become evident after the hail event and the estimated yield of the damaged crop economically supports the use of a labeled fungicide.

Figure 4. Pith showing discoloration resulting from hail stone hits on the stalk.

Figure 5. Husk showing bruises from hail.

Figure 6. Hail damaged kernels

Figure 7. Mature ear showing damage from previous hail event.

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To learn more about Delaro® fungicide, please visit https://www.cropscience.bayer.us/products/fungicides/delaro and contact your retailer. As with any crop-protection product, always read and follow label directions, consider forecasted environmental conditions, corn growth stage, and disease presence before applying a fungicide.

Weeds

Reduced plant populations and defoliation can lead to increased light penetration and weed pressure. Depending on the growth stage of the corn crop it may be too late to utilize herbicides for weed control. Yield estimations may need to be adjusted downward according to weed population size because of the nutrients and water utilized by the weeds.

Sources (web sites verified 6/5/2020)

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Legal Statements