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Replanting Options for Corn

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Evaluating damaged corn stands and determining when to replant is often a difficult task. Survival, health, and expected yield of the current stand must be weighed against replanting costs, additional management, and expected yield of a replanted crop. The options are rarely clear-cut because damaged corn is rarely uniform throughout the field. The following information will help when making evaluations and management decisions.

Estimating Surviving Corn Stand

The first impulse is to try to evaluate the corn stand immediately following the damaging event. However, five days of suitable growing conditions will allow time for new growth to appear on the surviving plants. Evaluating stands five days after the weather event should provide a better indication of surviving plants.

Multiple stand counts should be made in both injured and non-injured areas of the field. Use Table 1 to determine the length of row to count to

estimate plant stand. Count the plants within a row and multiply that number by 1,000. The product is the estimated number of plants per acre. This process should be repeated throughout the field in injured and non-injured areas. If stands are erratic, counting 50 feet of a row may be a better way to estimate corn stands. Compare the estimated stand to the population numbers in Table 2 to help determine the remaining yield potential in the field.

Table 2 contains older data from the Midwest but is still the best general guide available. Current research indicates that corn populations closer to 30,000 plants/A will provide maximum yield on better soils. When assessing corn stands on better soils, keep this factor in mind.

Hybrid Options

Planting corn late will reduce yield potential. There is a 1 to 2 percent per day yield loss for corn planted after early to mid-May in Kentucky. Thus, corn planted early to mid-June can yield 20 to 40 percent less than optimum plantings.

Late-planted corn will have a shorter growing season and growers should switch to earlier-maturing hybrids to avoid the risk of fall freeze injury. Earlier maturity hybrids will reduce

Table 1. Estimating corn stand.

Row		Plants in Row	Multiply by:	Estimated Plants/A
Width	**Length**			
Uninjured areas of the field:				
15	34′ 10″		1,000	
20	26′ 2″		1,000	
30	17′ 5″		1,000	
36	14′ 6″		1,000	
38	13′ 9″		1,000	
Injured areas of the field:				
15	50′		696.96	
20	50′		522.72	
30	50′		348.48	
36	50′		290.40	
38	50′		275.12	

Table 2. Relative grain yields for various planting dates and plant populations.*

Planting Date	Thousand Plants/A						
	25+	22.5	20	18	16	14	12
	Yield Potential (%)						
May 6	100	98	95	92	88	83	78
May 11	99	98	95	92	88	83	77
May 16	98	96	93	90	86	81	75
May 21	95	94	91	87	83	78	73
May 26	92	90	87	84	80	75	69
May 31	87	85	82	79	75	70	64
June 5	81	80	77	73	69	64	59
June 10	75	73	70	67	63	58	52

* Expressed as a percent of the yield considered optimal for a given planting date and plant population. Plants are assumed to be uniformly spaced within the row.

Source: Adapted from the National Corn Handbook (NCH-30), "Guidelines for Making Corn Replanting Decisions." Also appears as Table 5 in *A Comprehensive Guide to Corn Management in Kentucky* (ID-139).

Example (refer to Table 2):

A full stand of corn (25,000 plants/A) was planted on May 6 in a field that normally yields 150 bu/A.

- If the yield potential for a plant population of 25,000 planted on May 6 is 100%, the anticipated yield at harvest is 150 bu/A:

  150 bu/A x 100% = 150 bu/A

- Frost damage on May 21 reduced stands to 16,000 plants/A.
- Since the yield potential for a plant population of 16,000 planted on May 6 is 88%, the anticipated yield at harvest is reduced from 150 bu/A to 132 bu/A:

  150 bu/A x 88% = 132 bu/A

Re-planting a full stand of corn on May 31 would result in 87% yield potential or 130.5 bu/A.

grain drying costs at harvest. For early to mid-June plantings, hybrids of 113 to 116-day relative maturities will likely reach black layer before frost, but for plantings made after mid-June, hybrids of 110 to 113-day relative maturities or less are needed to reach black layer before frost. Table 3 includes location, planting date, and expected date to reach black layer (physiological maturity) for three hybrid maturities. The maturities in the table are based on growing degree days (GDD). Seed companies know the GDD requirements for each of their hybrids, and that information is typically available.

Late-planted corn in Kentucky is at higher risk for corn borer infestation. Hybrids with resistance to corn borers are an economically sound option for late-planted corn. Currently hybrids with resistance to corn borers will be labeled as YieldGard Corn Borer, YieldGard Plus, Herculex I, Herculex Xtra, AgriSure CB, or VT3. The seed industry appears to be poised to add several new traits or combinations of traits that offer corn borer resistance. Check with your seed dealer for additional traits that offer corn borer resistance.

Table 3. Expected date of physiological maturity (black layer) formation, based on location, planting date, and hybrid maturity (Growing Degree Days—GDD).

Kentucky Location	Planting Date	Different Hybrid Maturities (GDD)*		
		2400	2700	3000
		*Date to Reach Black Layer***		
Mayfield	Mar 15	Jul 28	Aug 8	Aug 20
	Apr 1	Aug 1	Aug 13	Aug 24
	Apr 15	Aug 6	Aug 18	Aug 30
	May 1	Aug 14	Aug 26	Sep 8
	May 15	Aug 23	Sep 4	Sep 19
	Jun 1	Sep 5	Sep 20	Oct 11
Bowling Green	Mar 15	Jul 27	Aug 7	Aug 19
	Apr 1	Jul 31	Aug 12	Aug 23
	Apr 15	Aug 5	Aug 17	Aug 29
	May 1	Aug 12	Aug 24	Sep 5
	May 15	Aug 21	Sep 2	Sep 16
	Jun 1	Sep 3	Sep 18	Oct 7
Henderson	Mar 15	Jul 27	Aug 8	Aug 20
	Apr 1	Aug 1	Aug 13	Aug 24
	Apr 15	Aug 6	Aug 18	Aug 30
	May 1	Aug 14	Aug 25	Sep 7
	May 15	Aug 23	Sep 4	Sep 19
	Jun 1	Sep 5	Sep 20	Oct 9
Somerset	Mar 15	Aug 3	Aug 15	Aug 28
	Apr 1	Aug 7	Aug 20	Sep 2
	Apr 15	Aug 13	Aug 26	Sep 8
	May 1	Aug 20	Sep 2	Sep 18
	May 15	Aug 29	Sep 12	Oct 1
	Jun 1	Sep 12	Oct 1	Oct 27
Lexington	Mar 15	Aug 8	Aug 21	Sep 3
	Apr 1	Aug 11	Aug 24	Sep 7
	Apr 15	Aug 16	Aug 29	Sep 12
	May 1	Aug 22	Sep 4	Sep 21
	May 15	Aug 30	Sep 14	Oct 6
	Jun 1	Sep 13	Oct 4	Oct 19
Covington	Mar 15	Aug 11	Aug 24	Sep 4
	Apr 1	Aug 14	Aug 27	Sep 7
	Apr 15	Aug 18	Sep 1	Sep 13
	May 1	Aug 25	Sep 7	Sep 22
	May 15	Sep 2	Sep 17	Oct 14
	Jun 1	Sep 15	Oct 7	Oct 26

* A hybrid with a 2,400 GDD requirement is roughly a 111-day relative maturity; a hybrid with a 3,000 GDD requirement is roughly a 118-day relative maturity hybrid.

** Date to reach black layer based an average of growing degree day calculations for each year from 1995 through 2004 (University of Kentucky Ag Weather Data Center).

Diseases and Replanted Corn

Delayed planting or late replanting could result in increased outbreaks of several diseases.

The "virus complex". Infections of maize dwarf mosaic virus and maize chlorotic dwarf virus, viruses which over winter in Johnson grass rhizomes and are spread (vectored) by aphids and leafhoppers, respectively, cause the virus complex. Compared to corn planted on time, late-planted corn is at an earlier stage of crop development during periods of peak vector activity and earlier growth stage infection usually results in more severe disease symptoms. Research by University of Kentucky entomologists has shown that vector populations can be higher on late-planted corn.

Fungal diseases of foliage. Several leaf diseases, especially gray leaf spot, may be more severe when corn is planted late. This risk is especially high for fields in continuous no-till corn. Late-planted crops will be at a comparatively earlier stage of development during periods of high spore activity if weather is conducive for these diseases. Leaf infection early in plant develop-

ment will reduce yields by decreasing photosynthetic capability and will increase susceptibility to stalk rots.

Fungal ear rots. Growers who plant full-season hybrids for grain production (120 to 130-day relative maturity) after June 1 increase the risk of fungal ear rots, because ears may not have sufficient time to dry adequately before harvest. Planting shorter-season hybrids after June 1 helps assure maturity before frost and lower grain moisture contents at harvest. In addition, fall armyworm can be more severe on late-planted corn. Ear feeding by this insect can increase the incidence of ear rot diseases by causing wounds that allow fungal invasion.

Fungal stalk rots. Increased stalk rot diseases could result from delayed planting. The shorter days and drier weather late in the season both may favor stalk rots, as these can result in decreased carbohydrate levels in the stalk and more plant stress, which can favor infection.

Growers who still want to plant corn late should use hybrids with resistance to these diseases. Disease resistance is not as common in mid-season and short-season hybrids as in full-season hybrids. Therefore, growers are advised to be sure mid- and short-season hybrids have resistance to the above diseases, particularly since these could become more severe than normal.

Herbicide Options and Replanting

A significant consideration before replanting corn or an alternative crop following corn stand losses is the herbicides that have already been applied to cornfields. Soil-applied herbicides containing atrazine have been the primary concern when replanting to grain sorghum or soybean. However, in cases where a postemergence treatment has been applied to corn, several of these herbicides can cause significant injury to the alternative crop. Table 4 lists corn herbicides and the potential risk associated with replanting corn, grain sorghum, or soybean. This table is not exhaustive, and the herbicide label should be consulted for more details on crop rotation limitations.

Corn Replanting Worksheet

Table 5 was developed to help a grower determine what management options are available for a poor stand of corn.

If the grower is considering replanting, the first step is to determine what herbicides have been applied and what crops can follow these herbicides. If the herbicide label allows replanting of corn or planting of other crops, then other steps can be taken.

The next step is to determine corn stand in the damaged areas of the field. Since poor stands are rarely uniform, the next step is to determine what percent of the field has a poor stand. Yield can be estimated for the damaged areas and the non-damaged areas of the field. Gross returns can be estimated once yield and price have been determined. Estimated yield and gross returns can be determined for replanting or planting another crop.

The next step is to account for additional costs associated with each option. For example, a poor stand of corn might require another postemergence herbicide application. A replanting option will require the cost of replanting plus the cost of removing the current stand of corn.

After the gross returns and additional costs have been calculated, partial returns can be determined. The option with the highest partial return is the best option, on paper.

Table 4. Risk to crops replanted following use of corn herbicides.[1]

	Risk Potential and Minimum Waiting Period before Replanting[2]		
Herbicide	**Corn**	**Grain Sorghum**	**Soybean**
Accent	No Risk	High: 10 months; 18 months if soil pH >7.5	Slight: 14 days
Accent Gold	No Risk	High: 12 months	High: Wait 10.5 months; 18 months under dry conditions and less than 2% O.M.
Aim	No Risk	No Risk	No Risk
Atrazine	No Risk	No Risk	Moderate; Slight in river bottom soils following a flood.
Basis Gold	No Risk	High: 10 months	High: 10 months
Beacon	Slight: Clearfield hybrids may be replanted immediately; 14 days for other field corn hybrids.	High: 8 months	High: 8 months
Bicep II Magnum, Cinch ATZ	No Risk	No Risk; Plant sorghum treated with a seed safener.	Moderate
Callisto	No Risk	High: 10 months	High: 10 months
Celebrity Plus	Slight: 7 days	High: 10 months; 18 months if soil pH > 7.5	Moderate: 4 months
Dicamba [Clarity, Banvel, etc.]	No Risk	Slight to Moderate: 15 days to 4 months depending on rate.	Slight to Moderate: 15 days to 4 months depending on specific product, use rate, and rainfall.
Distinct	Slight: 7 days	Moderate: 4 months	Moderate: 4 months
2,4-D	Slight: 7 days	Slight to Moderate: 3 months	Slight: 7 to 30 days depending on amount used
Equip	Slight: 15 days	High: 9 months	High: 9 months
Exceed	Slight: 1 month, Clearfield hybrids may have more tolerance than regular hybrids.	High: 10 months	High: 10 months, STS soybean varieties have more tolerance.
Expert	No Risk	No Risk: plant sorghum treated with a seed safener.	Moderate
Glyphosate (Roundup, Touchdown, etc.)	No Risk	No Risk	No Risk
Gramoxone Max	No Risk	No Risk	No Risk
Harness Xtra, Degree Xtra, FulTime, Keystone	No Risk	Moderate	Moderate
Hornet WDG	No Risk	High: 12 months	High: 10.5 months; 18 months under dry conditions and less than 2% O.M.
Liberty (LL-corn only)	No Risk	Slight: 70 days	No Risk
Liberty ATZ (LL-corn only)	No Risk	Moderate	Moderate
Lightning (Clearfield corn only)	High for conventional corn, Roundup Ready corn, and Liberty Link corn (8.5 months); Clearfield corn may be planted anytime	High: 18 months	Moderate: 9 months
Lumax	No Risk	High: 10 months	High: 10 months
Marksman, etc.	No Risk	No Risk	Moderate
Option	Slight: wait 7 days	Moderate: 2 months	Slight: 14 days
Permit	Slight: 1 month; Clearfield hybrids may be replanted anytime	Moderate: 2 months	High: 9 months
Princep	No Risk	Moderate	High
Prowl	High	High	No Risk
ReadyMaster ATZ	No Risk	No Risk	Moderate
Spirit	Slight: 1 month, Clearfield hybrids may have more tolerance than regular hybrids.	High: 10 months	High: 10 months, STS soybean varieties have more tolerance.
Steadfast	No Risk	High: 10 months, wait 18 months if soil pH >7.5.	Slight: 15 days
Steadfast ATZ	No Risk	High: 10 months	Moderate: 10 months

[1] This table is a guideline. Consult the herbicide label for additional details.
[2] Waiting period is defined as the time between herbicide application and replanting.

Table 5. Replanting decision guide for a damaged corn crop.

Line	Factor	Corn (keep)	Corn (replant)	Grain Sorghum	Soybean
1.	Will the labels of herbicides already applied allow another crop to be planted (yes or no)?				
2.	Planting date				
3.	Typical yields (bu/A) *For example, use a five-year average. Remember to adjust replanted corn yield potential for planting date.*				
	Determine expected yield of current corn crop *If stand is sporadic, use area A, B, and C to assess stand in different areas of field. If stand is uniform, use area A only.*				
4. a.	Area A, estimated corn stand (plants/A)				
b.	Area B, estimated corn stand (plants/A)				
c.	Area C, estimated corn stand (plants/A)				
5. a.	Area A, estimated yield (bu/A)				
b.	Area B, estimated yield (bu/A)				
c.	Area C, estimated yield (bu/A)				
6. a.	Area A, % of whole field (use decimal)				
b.	Area B, % of whole field (use decimal)				
c.	Area C, % of whole field (use decimal)				
7.	Estimated average yield of entire field (bu/A) *(Line 5a x Line 6a) + (Line 5b x Line 6b) + (Line 5c x Line 6c)*				
8.	Price/bu ($)				
9.	Expected total return/A for current corn crop ($) *Line 7 x Line 8*				
	Expected additional input costs for replanting				
10.	Tillage costs/A for replanted crop ($)				
11.	Seeding costs/A for replanted crop ($) *Includes price of seed, equipment and labor required for replanting.*				
12.	Fertilizer costs/A for replanted crop ($)				
13.	Pest control costs/A for replanted crop ($)				
14.	Total additional input costs/A for replanted crop ($) *Line 10 + Line 11 + Line 12 + Line 13*				
15.	Replanting date				
16.	Estimated yield for replanted crop (bu/A) *See Table 2 for replanted corn.*				
17.	Estimated price/bu ($)				
18.	Estimated total return/A for replanted crop ($) *Line 16 x Line 17*				
19.	Return over additional input costs for replanted crop ($) *Line 18 – Line 14* *If the resulting number is negative [-], replanting will give a negative return and replanting should not be done.*				
20.	Return of replanted crop over current crop *Line 18 – Line 9* *If the number in Line 20 is positive [+], then replanting is likely a good decision. If Line 18 is negative [-], the current crop should be kept.*				

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