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Making Replant Decisions for Slug Damaged Corn and Soybean Stands

Brian Jones, Extension Agent, Augusta County

Slugs cause significant economic injury to corn and soybean crops in Virginia every year. Symptoms of slug feeding will vary depending on the size or the growth stage of the crop, and the size of the slug. In corn, slug damage is typically limited to defoliation of emerging leaves. While extensive leaf feeding will have detrimental impacts to yield, rarely will slugs actually kill the corn plant because the growing point will remain below ground until the V6 growth stage. Slug damage to soybean is different however because the growing point of the soybean plant is within the emerging cotyledons. If slugs are actively feeding when germination occurs, they can feed on the cotyledons and cause death of the soybean plant. Luckily slug damage is typically localized in a field, and if scouting has caught the infestation early further damage can be prevented with targeted applications of the various slug baits that are available. If however, feeding injury has been severe enough to result in significant stand losses, then the difficult decision of whether to replant or not must be made.

Making the decision to replant requires careful consideration, and when all is said and done the economics must be positive in order for a replant decision to move forward. Replanting should only be contemplated if the cause for the sparse stand can be corrected. Generally in Virginia, planting later into warm soils will promote rapid early growth in the young plant, which should then be able to outgrow the slug pressure. Typically replanting will require a complete removal of the existing failed stand, rather than filling-in with new plants. This is particularly true with corn, because plants of uneven sizes and maturity perform poorly. Filling-in may be acceptable in a few cases, specifically: 1) If you can fill-in within two weeks of the original planting date; and 2) If you can get a uniform plant spacing within the row between the old and new plants. Unfortunately with slug injury, 2 weeks is probably too early to indicate a problem. Waiting longer than 3 weeks between plantings for fill-ins generally reduces yield potential by at least 10%.

The following provides a set of step-by-step procedures that may be followed when considering whether to replant a damaged stand:

1. *Estimate the possible yield of a full stand at the original planting date.*
   This is the "best guess" estimate of what a realistic yield for the crop would have been prior to damage.

2. *Determine population and uniformity of the existing stand.*
   Count the number of live plants in the damaged areas to determine the plant population of these areas. This should be done in at least 3-5 spots in the affected area since severity of slug damage can vary considerably. An easy way to do this is to count the plants in a length of row equal to one-thousandth of an acre (table 1). Determine the number of plants in the specified row length and multiply by 1000 to determine plants per acre. In drilled soybeans it may be easier to determine stand density with the "hula hoop" method. Using any perfectly round hoop with a known diameter, toss the hoop in at least five randomly selected locations within a damaged area. Average the

number of plants counted within each hoop, determine the hoops area and convert to plants per acre using the following formula:

*Plants per Acre = (average count * 43,560) / (3.14 * hoop radius in inches^2)*

3. *Estimate the yield potential of the existing stand.*
   Estimating how much a damaged stand will likely yield is the most difficult decision in the process. This is in many cases an educated guess, because potential yield is strongly affected by environmental conditions. Table 2 provides estimated corn and soybean yield potential at various plant populations (yield as % of normal). Uniformity of the stand is also critical. Virginia research in soybean has indicated that large gaps cause as much yield loss as low plant populations. To determine the percentage of gaps in the damaged stand, pace off sections of row 20 paces long in at least 6 areas of the field. Determine (by counting the number of paces) the total length of row lost to 2-3 foot gaps. Then determine the percent of stand lost to gap spacing. Table 3 provides some guidance for estimating how much yield loss (as % of normal) you may expect in the soybeans from gaps.

4. *Estimate the potential yield of replanted full stand, on the replant date.*
   The delay in planting date caused from deciding to replant crops injured by slugs may have a significant affect on the final yield. Table 4 gives some guidance on the potential corn yield loss based on delaying the planting date. Remember too that if the decision was made to fill in instead of kill the entire field, later emerging plants cannot effectively compete with the remnants of the original population for sunlight water and nutrients.

5. *Estimate the costs of replanting.*
   Even if the yield from replanting would be greater than that from the damaged field, the cost of replanting may exceed the value of the additional yield gained from replanting. Estimate as closely as possible seed cost (unit cost by seeding rate), fuel, machinery and labor costs associated with replanting, pesticide costs (usually no additional pre-emergence herbicide will be required, but a burndown will), and any other costs including interest, drying later maturing corn or beans, or the cost of delaying planting the fall small grain if desired.

6. *Compare the value of leaving the reduced stand to a replanted stand.*
   The following worksheet (Table 5) provides a guideline for comparing the costs of replanting versus leaving a damaged stand.

Table 1. Length of row to equal 1/1000th of an acre for several common row widths.

Row Width	Row Length
30"	17 feet 5 inches
15"	34 feet 10 inches
10"	52 feet 3 inches
7"	74 feet 9 inches

Table 2. Estimated corn and soybean yield potential (% of normal yield) for various plant populations.

Corn Population	30" Rows	Soybean Population	30" Rows	7" Rows
22,000	98%	160,000	100%	100%
20,000	95%	120,000	100%	100%
18,000	91%	80,000	100%	96%
16,000	88%	60,000	94%	92%
14,000	84%	40,000	88%	87%
12,000	80%	20,000	79%	77%
10,000	75%	10,000	64%	58%

Table 3. Soybean yield loss in response to decreased plant population and missing plants.

% Stand Lost to Gaps	Plant Population Remaining (thousands plants/A)		
	140	105	70
0	100	97	95
10	98	96	93
20	96	93	91
30	93	90	88
40	89	86	83
50	84	81	78
60	78	75	73

Table 4. Potential corn yield loss (% of optimum) for the Valley region as a result of planting date and population.

Planting Date	Plants per Acre at Harvest					
	10,000	15,000	20,000	25,000	30,000	35,000
	----------% of Optimum Yield----------					
10-Apr	62	76	86	92	94	93
20-Apr	67	81	91	97	99	97
30-Apr	68	82	92	98	100	98
9-May	65	79	89	95	97	96
19-May	59	73	84	89	91	89
29-May	49	63	73	79	81	79

Table 5. Corn and Soybean Replant Worksheet

Line A	Estimated stand density of damaged stand	_____	plants/A
Line B	"Normal" yield in bu/A	_____	bu/A
Line C	Effect of damaged stand on yield potential (see Tables 2 and 3)	_____	%
Line D	Estimated yield from sparse stand; multiply Line B by Line C / 100	_____	bu/A
Line E	Estimated market value of crop	_____	$/bu
Line F	Estimated income from sparse stand: multiply Line E by Line D	_____	$/A
Line G	Extra herbicide needed for burndown	_____	$/A
Line H	Expected net income from damaged stand (Line F - Line G)	_____	$/A
Line I	Estimated cost to replant: Total Line 1, 2, 3 and 4 below:	_____	$/A
	1. Seed costs		
	2. Fuel, machinery, labor costs		
	3. Pesticides		
	4. Other costs		
Line J	Effect of planting date on yield (Table 4)	_____	%
Line K	Estimated yield from replanted stand: multiply Line B by Line J / 100	_____	bu/A
Line L	Estimated income from replanted stand: multiply Line E by Line K	_____	$/A
Line M	Net income from replanted stand: subtract Line I from Line L	_____	$/A
Line N	Profit or loss from replanting: subtract line F from Line M		$/A