into consideration, among other factors, the per cent of cracked corn and foreign material. This factor of cracked corn and foreign material is determined by the amount of the sample that will pass through a 12/64″ round hole sieve, plus the foreign material that is retained on the sieve. The maximum tolerance for this factor for grade No. 2 corn, which is the basic grade in trading channels, is 3%. In these tests, corn harvested with

Corn Harvesting Losses on Machines Tested in Riverside and Kern Counties.

	Average loss in per cent of total yield	
Gathering unit loss	**Header**	**Snapper**
Ear corn	2.9	2.0
Shelled corn	0.9	3.2
Total	3.2	5.2
Combine loss—exclusive of gathering unit		
Unshelled corn	0.4	0.6
Shelled corn	2.8	0.4
Total	3.2	1.0
Total harvesting loss	6.4	6.2

Kernel moisture content varied from 9.9% to 20.6%. Yield varied from 2,700 pounds to 7,000 pounds of shelled corn per acre.

a header and threshed at cylinder speeds up to 3,800 feet per minute was below the 3% tolerance.

In addition, although it does not affect the grade, the amount of mechanically damaged kernels—chipped or broken—that did not pass through the 12/64″ round hole screen was determined in laboratory analyses. This information helps to evaluate the shelling action of the cylinder. The presence of such kernels may complicate the storage of wet corn. There was a definite correlation between the speed of the cylinder and the per cent of this type of mechanically damaged kernels. The damage to the kernels in the self-propelled machine varied from an average of 6% at 1,800 feet per minute to approximately 20% at 4,800 feet per minute.

Only two cylinder speeds—approximately 1,800 and 2,800 feet per minute—were used with the straight-through harvester with snapper unit. Mechanical kernel damage in this unit was also related to moisture content of the kernels and the clearance between the cylinder and concave. The damage was greater at higher moisture contents, or when the clearance between the cylinder and concave was less.

The cylinder loss—unthreshed corn—was related to the kernel moisture. The trend, as indicated by a limited amount of data taken at a cylinder speed of approximately 2,800 feet per minute, showed losses varying from about 1% to 13.5% moisture to 3% at 18.5% moisture for the combine equipped with the snapping unit.

The machine losses—exclusive of header—were definitely influenced by the feed rate. The graph, at the lower right on this page, represents results of selected tests on the self-propelled unit

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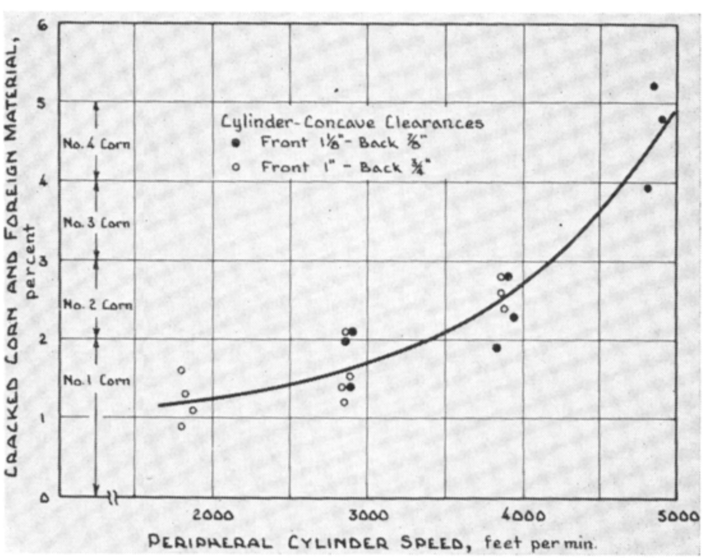
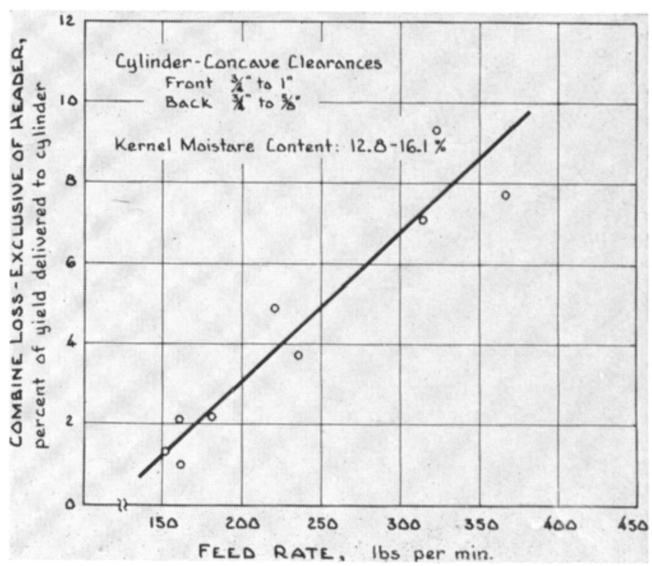
The commercial grade of corn as influenced by cylinder speed for the header-equipped machine.



Combine losses, exclusive of header loss, as affected by feed rate for the self-propelled unit.



Field Corn Pickers

tests indicate two operational factors have important effect on field losses

W. N. King, Lloyd Peterson, and R. G. Curley

Corn picker field tests made in Kern and Los Angeles counties in 1954 show that ground speed and snapping roll adjustment are the most important factors determining picking losses.

Corn moisture content has usually been considered to be the most important factor influencing losses, but in these tests, there was no apparent correlation between machine picking losses and moisture content.

The tests were made in fields—selected at random—where harvesting equipment was in use. Practically all makes and models of corn pickers operating in the test areas were included.

Ear corn on the ground was gleaned from the test area before and after the picking operation. It was air-dried, shelled, and weights recorded as ear corn loss. Shelled corn losses were estimated by tossing a 40″ × 40″ frame in the test area and gleaning kernels included in its boundaries. This process was repeated until an average scattering of shell corn could be determined. Shell corn weights were determined and recorded as shell corn loss. Ground speeds and adjustments of the machines were noted in each case. Grain samples were taken for moisture determination.

The tests results showed that corn losses chargeable to machine picking ranged from a low of 96 pounds per acre to a high of 685 pounds per acre, with

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PICKERS

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an average of 320 pounds per acre. This total loss was made up of an average of 230 pounds per acre shell corn loss and 90 pounds per acre of ear corn loss. These weights are losses chargeable to the machines and do not include ears dropped before harvest. The average yield of the fields tested was 5,000 pounds per acre.

The field losses—in each test case—represent the results of the influence of a number of variable factors, such as moisture, machine adjustment and operation, corn variety, time of day. It is not possible to separate the influence of these variable factors so that an absolute loss value can be assigned to them. It is possible, however, with those factors that strongly influence the loss to determine the way in which they cause it to vary.

With due regard for the limitations of the test data, the following losses can be expected at the indicated field speeds:

Speed (Miles per hr.)	Average field loss (Pounds per acre)
2.0	200
2.5	250
3.0	400
3.5	670

In similar fashion the relationship between the amount of space between the snapping rolls and the field loss is found to be:

Space between snapping rolls (Inches)	Average shell corn loss (Pounds per acre)
0 (Rolls touching)	200
½	320
1	580

For these tests the space between rolls is defined as the distance from the top of the rib on one roll to the root of the roll on the other at a distance of about one foot above the points of the snapping rolls.

When kernel moisture content is plotted against field loss, as in the lower graph, a scattered pattern results and no correlation is apparent. While the results of these tests indicate that kernel moisture content is not a strong factor in determining the amount of field loss chargeable to the machine, the influence of moisture should not be disregarded. As the moisture content goes down, preharvest losses from ears dropping to the ground and from broken-over stalks may increase. Also, at the lowest moistures, more careful operation is necessary to keep losses low.

By coding the points plotted on the moisture loss graph, the influences of field speed and picking roll adjustment and modification on field losses are illustrated. Where field speeds were under 2½ miles per hour and the space between picking rolls was less than ½″, losses of less than 300 pounds per acre were found. Where either field speed was over 2½ miles per hour, or the distance between snapping rolls was ½″ or over, field losses of from 300 to 400 pounds per acre were found. Where a combination of speed over 2½ miles per hour and either a distance between snapping rolls of over ½″ or arc welded beads were run along the snapping rolls, losses of 400 to 700 pounds per acre were found.

Sheller losses were determined in some tests. They were found to be negligible except where the sheller was overloaded or mechanically disarranged. No other factors were noted that seemed to have any marked effect on losses.

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APHID CONTROL

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about the same results when used at 10 to 12 ounces of actual material per acre but must not be applied within seven days of cutting.

Occasionally it may be necessary to treat stubble alfalfa as soon as the hay is removed from the field. In such circumstances, only parathion or malathion should be used. Systox is most effective if used following the first irrigation when there is a good regrowth 4″ to 6″ high. Best results were obtained with treatments made at this time.

Normal applications of toxaphene as used for *Lygus* bug control will—in most cases—hold the yellow clover aphid in check. Usually 10% toxaphene plus 50% sulfur at 30–35 pounds per acre has been sufficient, but toxaphene-DDT combinations have given better results. Toxaphene—15% with 5% DDT and 40% sulfur—has given excellent control, and toxaphene-DDT combination sprays are promising. However, in general, dusts are preferred to sprays because of better penetration into the lower parts of the plants, which is the normal habitat of this aphid.

Systox at the rate used on hay alfalfa has given excellent results, although the 4-ounce application is preferred when the alfalfa is large. When spider mites also are a problem, the grower should use 6 to 8 ounces per acre, as lower rates are not sufficient for control of these latter pests.

The appearance of the yellow clover aphid in California has made the production of alfalfa more costly but has not ruined it as a crop. There is no reason that alfalfa should not be as important a part of California agriculture in the future as it has been in the past.

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YELLOW CLOVER APHID

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fornia and north as far as Fresno. It has also spread east over Texas and north through Oklahoma into Kansas and Arkansas.

The yellow clover aphid in California does well on all commercial varieties of alfalfa it has encountered in southern California. It also prefers bur clover, *Medicago hispida*, sour clover, *Melilotus indica*, and black medic, *Medicago lupulina*, and will breed on berseem, *Trifolium alexandrium*. It will not live on red clover, ladino clover, Hubam clover, subterranean clover, vetch, or birdsfoot trefoil.

Ladybird beetles have provided the only effective biological opposition that the yellow clover aphid has encountered in California. Other predatory insects, as lacewings, syrphids, pirate bugs, and big-eyed bugs, do eat some yellow clover aphids, but their populations are not large enough to balance the yellow clover aphid population. Therefore, they have been of little practical value in biological control.

In July, 1954, some fields had their aphid populations cleaned up by ladybirds but usually too late to save the hay crop. In the spring of 1955, the first effective work by ladybirds appeared shortly after mid-April in a few fields adjacent to barley. Since then their number and effectiveness have increased so that by mid-May they were giving practical control in a majority of desert alfalfa fields. The widespread use of insecticides in alfalfa fields appears to have only slightly delayed the appearance of effective ladybird populations.

No internal parasites of the yellow clover aphid have ever been observed in California. Under especially wet conditions, some yellow clover aphids are killed by entomophagous fungi.

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