MINNESOTA FEEDSERVICE

University of Minnesota Agricultural Extension Service, St. Paul — Winter 1965

Crop Variety Recommendations for 1965

Harley J. Otto

Selection of superior varieties is an important aspect of good crop production. Maturity, yielding ability, plant height, lodging resistance, disease resistance, winter hardiness, and market quality—all are factors disinguishing one variety from another. A single variety seldom possesses all desirable factors; a grower must carefully select the varieties that most nearly meet his needs.

Each year University of Minnesota researchers review data from crop variety trials and revise the list of recommended varieties. This list is based on several years of extensive tests conducted at experiment stations, in greenhouses, in laboratories, and in farm fields. A variety must be tested at least 3 years before it is recommended.

For 1965, Garland oats and A-100 and Chippewa-64 soybeans are added to the recommended variety list. Kindred and Traill barley; Ajax, Andrew, and Burnett oats; and Comet and Norchief soybeans are dropped.

Barley

Larker and Trophy, barley varieties released by the North Dakota Agricultural Experiment Station, have been produced by growers long enough for thorough evaluation by malting and brewing industries. Both industries apparently are satisfied with their quality.

University tests in the main barley-growing areas of Minnesota, showed both Larker and Trophy to be at least equal to Traill in yield and standability and considerably superior to Kindred in both characteristics. In percent of plump kernels, both Larker and Trophy are superior to Kindred and Traill. Larker produces a higher percentage of plump kernels than does Trophy.

Parkland, a variety with blue aleurone color, is recommended for planting only in Minnesota's northwest counties. It is similar to Trophy in yield, standability, and percent of plump kernels.

Oats

In 3 years of testing, Garland oats produced higher yields than did any other variety of the same maturity. It is medium early in maturity, heading about 3 days later than Minhafer and 4 days earlier than Garry. Its straw strength is acceptable. It has as good resistance to stem rust as any variety, is only moderately susceptible to crown rust, and is resistant to smut. Since no commercial variety is completely resistant to crown rust, Garland is a good variety in this respect.

Andrew, Ajax, and Burnett are no longer on the recommended list because they do not perform as well as some of the more recently developed varieties of similar maturity.

Seed of several new oat varieties developed in other states has been increased for distribution in Minnesota in 1965: Brave from Illinois and Clintland-64 and Tippecanoe from Indiana. Brave is early to medium early in maturity. In 2 years of testing, it headed about 2 days later than Minhafer. It is fair in standability and yield, resistant to prevalent races of stem rusts and smut, and susceptible to crown rust.

Clintland-64 has been tested only 1 year. So far it appears to be of the same maturity as Garland, stands slightly better, does not yield as well, has approximately the same degree resistance to stem rust, and is slightly better in resistance to crown rust.

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Varieties Recommended For Planting In 1965

Barley	Larker, Parkland (for northwest counties only), Trophy
Oats	Early: Minhafer Medium early: Dodge, Garland, Goodfield (where lodging is a serious problem) Medium late: Portage, Garry, Rodney
Wheat	Hard red spring: Crim, Justin, Pembina, Selkirk Durum: Lakota, Wells Hard red winter: Minter
Flax	B-5128, Bolley, Redwood, Summit, Windom
Soybeans	A-100, Acme, Chippewa, Chippewa-64, Flambeau, Grant, Harosoy, Lindarin, Merit, Ottawa Mandarin
Sunflowers	Arrowhead, Mingren
Field Peas	Chancellor, Stråal
Millet	Proso: Turghai Foxtail: Empire, White Wonder
Alfalfa	Ranger, Vernal
Birdsfoot Trefoil	Empire
Red Clover	Dollard, Lakeland
Sweet Clover	Evergreen, Goldtop, Madrid
Kentucky Bluegrass	Park
Bromegrass	Achenbach, Fischer, Lincoln
Sudangrass	Piper
Timothy	Climax, Itasca, Lorain

For further information on field crop varieties (including variety descriptions and detailed performance data), see Miscellaneous Report 24, "Varietal Trials of Farm Crops," available from your county agent or from the Bulletin Room, University of Minnesota, St. Paul, Minnesota 55101.

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Tippecanoe also has been tested only 1 year. In 1964 it had the best standing ability of any variety tested. Its maturity, yield, and disease resistance were about the same as Minhafer.

Lodi, a variety developed in Wisconsin, continued to look good in 1964 tests. Seed was distributed to Minnesota growers in 1964. It is a late maturing, high yielding variety with good disease resistance. It has better standing ability than any variety of the same maturity.

Further testing of Brave, Clintland-64, Tippecanoe, and Lodi is required before a decision regarding recommendation can be made.

Winter Rye

Seed of Von Lochow winter rye was distributed to growers in fall 1964. This variety produces high yields in the absence of winter-killing but is less winter hardy than recommended varieties. It had better standing ability than any other variety in recent tests.

Flax

No changes were made in the list of recommended varieties for 1965. However, flax rust continues to threaten the crop. *So it is still highly recommended that susceptible varieties not be grown.*

A flax variety survey conducted by the Minnesota Crop and Livestock Reporting Service in 1964 indicated that approximately 11 percent of the state's acreage was seeded to rust-susceptible varieties. Production of susceptible varieties not only endangers the acreage on which they are grown but may allow development of new rust races which could attack presently immune varieties.

Soybeans

Varieties A-100 and Chippewa-64 were added to the recommended list for 1965.

A-100 is slightly earlier in maturity than are Harosoy and Lindarin. Its yield potential is equal to these varieties but it has better standability and higher oil content. It is recommended only for the southern corn maturity zone.

Chippewa-64 performs the same as Chippewa except that it is resistant to *Phytophthora root rot.* This disease was recently found in two south-central Minnesota fields. Chippewa-64 offers insurance against this disease without sacrificing any of the desirable features of Chippewa. Therefore, Chippewa-64 probably will replace Chippewa as seed supplies become available.

CERTIFIED SEED ASSURES VARIETAL PURITY

Recommended varieties demonstrated superior performance compared to other varieties tested. If a grower is to obtain the benefits of these varieties, he must plant seed of known varietal purity. This assurance is best obtained by planting certified seed.

Certified seed is no more than three generations removed from foundation seed maintained by the University of Minnesota and known to be pure for variety. Production and processing of certified seed are supervised by the Minnesota Crop Improvement Association through field and laboratory inspections.

A test of bacterial wilt resistance of several seed lots of Vernal alfalfa was recently conducted at the University; results illustrate the importance of planting seed with known varietal purity. Two lots of certified Vernal alfalfa seed produced plants that did not differ significantly in wilt resistance from a check lot known to be Vernal. Two of the six uncertified lots had the same degree of wilt resistance as the check lot. Four lots of uncertified seed, represented as Vernal, produced plants that were only 15 to 36 percent as wilt resistant as the Vernal check lot.

In earlier tests of many seed lots represented as Ranger alfalfa, only 54 percent of the uncertified lots performed like Ranger with respect to plant growth type. Winter-hardy alfalfa varieties such as Ranger produce a low growing rosette type of regrowth in the fall following clipping. Nonhardy types produce a tall erect growth following similar treatment. So only lots with plant growth types like Ranger could be expected to have the same degree of winter hardiness as Ranger.

In these tests, only 45 percent of the uncertified lots had the degree of wilt resistance found in Ranger. If a grower buys from one of these lots of uncertified seed, he would have only a 50-50 chance of obtaining alfalfa performance he should expect with Ranger.

In addition to varietal purity, certified seed must meet high standards for freedom from weeds, other crop seeds, and inert material. It also must be high in germination. Within certified seed, a tolerance for these factors is allowed. For example, the minimum germination allowed in small grains is 85 percent. Individual lots may have considerably higher germination so some certified seed lots may be better than others. Study the analysis tag for this information.

Seed cost represents only a small fraction of the total cost of producing a crop. A crop producer cannot afford to take a chance on planting poor seed. It is a wise policy to plant certified seed purchased from a reliable seedsman.

The University of Minnesota Agricultural Extension Service is sponsoring a series of 13 dealer meetings to present and discuss the latest research findings dealing with crop varieties; seeds; soils; fertilizers; and insect, weed, and disease control.

These meetings are scheduled as follows:

January

Date	City	Place	Time
4	Rochester	Holiday Inn	4-9 p.m.
5	Owatonna	Inn Towne Motel	4-9 p.m.
6	Mankato	Inn Towne Motel	4-9 p.m.
7	New Ulm	Tropicana Club	4-9 p.m.
11	Hutchinson	Garden Supper Club	4-9 p.m.
11	Cambridge	Camber Restaurant	4-9 p.m.
18	Fairmont	Hotel Augusta	4-9 p.m.
19	Slayton	Club Royal	4-9 p.m.
20	Montevideo	Hotel Hunt	1:30-5 p.m.
21	Alexandria	American Legion	4-9 p.m.
26	Moorhead	Holiday Inn	4-9 p.m.
27	Thief River Falls	Legion Club	4-9 p.m.
28	Park Rapids	American Legion	1:30-5 p.m.

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BEEF FUTURES TRADING

Dale C. Dahl and Kenneth E. Egertson

Futures trading of live beef cattle began November 30, 1964, on the Chicago Mercantile Exchange. This development requires farmers and businessmen to refresh their understanding of what futures marketing involves and how it applies to the marketing of cattle. This article provides some of that background information.

The Minnesota cattle feeder finds himself in the following kind of situation each time he starts a new feeding operation.

He is interested in buying, say 23 yearlings (weighing 650 pounds) priced at $24 per hundredweight (cwt.) in October. He wants to use his feed, labor, and equipment over the winter and spring months to finish these animals to slaughter weight. From experience he estimates these feedlot costs at about $90 per animal to cover feed, labor, equipment, and interest and also provide a reasonable return on capital invested.[1] His cost calculations look like those in box A of diagram 1.

Diagram 1. Beef feeder cash transactions

A	October
Buys yearlings	
23 head × 650 lb. each × 24¢ =	$3,588
Estimates feedlot costs	
23 head × $90 =	2,070
Total production cost	$5,658
Estimates needed slaughter price[2]	
(1) 23 head × 1,100 lb. (choice steers) =	25,300 lb.
(2) $5,658 (total cost) ÷ 25,300 lb. =	22.36¢/lb.

B	June
Sells 23 choice steers (1,100 lb.) at ??¢	
If price is more than 22.36¢ = profit	
If price equals 22.36¢ = covers all costs	
If price is less than 22.36¢ = loss	

The cattle feeder then calculates what slaughter prices must be if he is to cover the $2,070 feedlot costs as well as the original yearling purchase. If he intends to feed out the animals to 1,100 pounds he will cover all production costs if his slaughter steers sell in June for $22.36 per cwt.

The cattle feeder, knowing this information, will then review outlook information to estimate slaughter prices he can expect in June. If price prospects are $22.36 per cwt. or more he will probably make his investment and begin the feeding operation. If his price expectations become a reality he will recover the purchase value of the yearlings and the $2,070 or make an extra profit. If he was too optimistic he will suffer a loss (see box B of diagram 1).

Several times in the past few years prices of slaughter cattle have been below farmers' expectations. Unable to forecast the direction and magnitudes of price change, many cattle feeders have incurred losses despite their technical and managerial efficiency.

Risk of loss by price change is basic to many aspects of agricultural production and marketing. Nevertheless, for some commodities, it is possible to shift most of this risk to people not directly involved in handling the product. This can be done through futures market transactions.

The Futures Market

The futures market does not deal in physical commodities. Instead it deals with promises to deliver or receive a commodity at some future time. These promises are made in the form of a legal "contract." Futures contracts are bought and sold on an organized market in much the same way that stocks and bonds are exchanged in the financial markets. The futures contract always specifies the quantity and quality of the product to be delivered and the place and time at which it will be delivered.

The people who deal on the futures market are called "speculators" or "hedgers."

Speculators are those interested in dealing with the futures contract itself for the purposes of making short-term financial gain as the prices of futures rise and fall. They accept the price risk.

Hedgers, by contrast, are people who are interested in dealing with the futures contract for the purpose of avoiding risk of loss by price change.

Hedgers are generally people who have possession of a commodity and wish to (1) store it, (2) transport it, or (3) perform additional services upon it before resale. For example, a local grain elevator will generally perform the function of storage before sale. In practice he attempts to shift price risk from himself to the speculators in the grain market by means of the hedging process. Thus, he eliminates the risk of losing his storage margin because of price change over time.

What Is Hedging?

Hedging is a process whereby a purchase or sale on the cash market is countered by a simultaneous and opposite purchase or sale in the futures market. This operation has been quite common in such commodities as food and feed grains, eggs, oils, cotton, wool, lard, and pork bellies.

In a case involving a country grain elevator, the elevator operator will purchase grain and store it until some future time, wishing to make profitable use of his storage facilities. The elevator operator is uncertain of what the price of this grain will be in the future. To avoid possible loss by price change during the storage period elevator operators will "sell" (contract to deliver his stored grain in some future month) a futures contract on that grain in the futures market.

Futures prices normally exceed cash prices by the storage, transport, or processing costs between the day of cash purchase and the future delivery month. If the elevator operator "sells" a futures on his grain, the futures price he will receive includes the present cash price plus the storage cost that would be added before the future delivery month. He then may do two things: (1) he can allow the futures contract to mature and deliver on it, or (2) he can "buy" back an offsetting futures contract before maturity and sell on the cash market.

Futures prices and cash prices will be close to the same amount in the delivery month. The price levels are not important to the elevator operator so long as they differ only by storage or transport costs. No matter what happens to the price of cash grain as delivery month approaches, the elevator operator has made his storage cost differential and has also protected himself from risk of loss by price change. At

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[1,2] In addition, the feeder calculates his marketing costs. These vary by his location relative to the market outlet he wants to use.

(Beef futures trading . . . from page 3)

the same time, however, he also has "protected" himself from chance of any price gains that he would have made if he had not hedged.

This hedging process may take on different forms, may be valuable to different people for different reasons, and may cover only a few days or several months in duration.

The futures market is now dealing in contracts to deliver live cattle. Within a short period the futures market may also be employed in the trading of beef carcasses.

Application to Beef Marketing

The announced trading unit for the beef futures market will be 25,000 pounds of steers, live weight basis. The standard contract specifies delivery of (1) steers grading choice or better, weighing 1,000 to 1,150 pounds with estimated yield requirements of 61 percent; or (2) steers grading choice or better, weighing 1,151 to 1,300 pounds with 62 percent estimated yield. Tolerances and substitution possibilities are outlined in the contract details.

The initial contracts call for delivery in April, June, August, and October. The basic delivery point is the Chicago stockyards. However, delivery can also be made at Omaha at a differential of 75 cents per cwt. below the Chicago price.

Trading in beef futures requires a margin typical of other futures markets. The initial margin requirement deposited with the brokerage firm has been set at $500 (Chicago) per trading unit. This deposit is used by the brokerage firms to maintain margin requirements specified by the futures exchange. The maintenance margin varies but may be figured at about $300 per trading unit. This means that if the market position of the hedger becomes less favorable (future price increases), the remaining $200 is used by the broker to rebuild margin requirements with the exchange clearinghouse.

How a Cattle Feeder Could Hedge

Cattle feeders are potential hedgers in the beef futures market; they hold an inventory of cattle for future sale. A cattle feeder could sell a contract for future delivery of cattle—either at the time feeder cattle are purchased or at some later date. A market speculator would buy this contract, agreeing to take delivery of the cattle (if the seller chose to deliver) during the delivery months.

To illustrate, let's continue with the first example where a cattle feeder buys 23 yearlings. Recall that he would need $22.36 per cwt. to cover the yearling purchase plus all feedlot costs. Now let's see what he could do by using the futures market to hedge his position.

If in October the June beef futures are selling at $22.36 per cwt. (see box C in diagram 2) he could assure himself of favorable returns on capital and labor if he decided to hedge. By selling a June futures contract he assures himself of a price of $22.36 next June. He also obligates himself to *either* (1) deliver the number, weight, and quality of cattle specified in the contract (with allowable substitutions) at $22.36 before the contract expires or, as is true in nearly 99 percent of grain hedges, (2) to buy an offsetting contract of the same futures month just before maturity and at the then current market price (see box D in diagram 2 below).

Diagram 2. Beef feeder cash and futures transactions

Cash transaction	Futures transaction
October	
A Buys 23 yearlings (650 lb.) at 24¢	**C** Sells June futures contract (one unit) at 22.36¢[3]
June	
B Sells 23 choice steers (1,100 lb.) at 21.00¢ 22.36¢ 24.00¢	**D** Buys June futures contract (one unit) at 21.00¢ 22.36¢ 24.00¢

Normally, the respective cash market price and the futures market price in the delivery month will be very close together (compare boxes D and B, diagram 2).

For example, consider three different price situations in June: (1) where price expectations were realized (June cash price was $22.36), (2) where prices were lower than expected (June cash price was $21.00), and (3) where prices were higher than expected (June cash price was $24.00). Assume in each case the cattle feeder has hedged by transacting in the futures market. What would be the outcomes?

1. If choice cattle prices in June are at $22.36 the feeder would be in the same position as he would have been without hedging.

2. Where choice cattle prices are $21.00 per cwt. in June, he would have lost 1.36 cents per pound in his feeding operation if he had not hedged. By hedging, however, he would cover his feeding costs by selling a June futures in October (at $22.36). The cash and futures transactions in June would offset one another.

3. If choice cattle prices in June are $24.00 per cwt., he would have gained 1.64 cents per pound had he not hedged. If he did hedge, he would again assure himself of $22.36 in October and the June cash and futures transactions would cancel out any gains in that month.

[3] This price does not take into account cost of transporting the cattle to the delivery point specified in the contract.

Cost Considerations

Hedging the cattle feeding operation would include additional costs that must be considered:

1. Brokerage fee—cost of professional selling and buying services. Typically, this would involve about $36 for the entire hedging operation.

2. Inspection and yardage—If livestock are delivered these costs may have to be covered by the feeder.

3. Interest on margin deposits—where the feeder must borrow to provide the margin required by the broker, some additional interest charges would be incurred.

Conclusion

Futures trading of live cattle will not solve all of the U. S. cattle feeder's income problems. But the potential for hedging the risk of price change should bring him some price stability and reduction of uncertainty.

There still remains the question of whether futures trading will work for live beef cattle. Some argue it will not, others maintain great hope for it. A proper evaluation of the cattle futures market can come only after several months of market activity have been registered.

If you are interested in any further information regarding beef futures trading, you should contact either the Chicago Mercantile Exchange or local brokers dealing in the commodity market. Your county agent also has a copy of beef futures regulations.

AVAILABLE PUBLICATIONS

Single copies of the publications below are available without cost from your county extension office or from the Bulletin Room, University of Minnesota, St. Paul 55101.

Misc. Report 56. *Fertility Status of Minnesota Soils as Shown by Soil Tests.*

Misc. Report 24. *Varietal Trials of Farm Crops* (revised for 1965).

Ext. Folder 212. *Chemical and Cultural Weed Control in Field Crops* (1965).

Ext. Pamphlet 194. *Crop Production Guide for Minnesota* (1965).

WHAT ABOUT SORGHUM-SUNDANGRASS HYBRIDS?

A. R. Schmid and J. R. Justin

Sudangrass and forage sorghums have been used in Minnesota for many years. A few years ago, seed companies began to develop and sell hybrids between sudangrass and either forage or grain sorghums. These hybrids have some characteristics of each parent type, but are different from both.

While sudangrass is well suited to grazing and green chopping, and forage sorghums work best for silage, hybrids can be used in all three ways, but are not necessarily as good for pasture as sudangrass or as good for silage as forage sorghums.

Sorghum-sudangrass hybrids can satisfy a need in Minnesota agriculture because they make rapid summer growth and can provide grazing and/or green chop in midsummer when many permanent pastures are supplying little grazing.

Sorghums, including sudangrass and the hybrids, are generally more drought resistant than corn and several other traditionally grown crops. This can mean feed production when other crops are being seriously damaged by lack of moisture. These characteristics make sudangrass and sorghum-sudangrass hybrids valuable as supplemental pastures to relieve grazing pressure on permanent pastures in midsummer.

Sudangrass and the hybrids can be used for hay, but because of heavy stems are difficult to dry and do not make hay with as high quality as bromegrass or timothy or combinations of these with legumes.

Many acres of sorghum-sudangrass hybrids were grown for silage in 1964. Much of this acreage was planted because it did not count against the feed grain acreage of a farm as did corn or small grains for silage. Farmers concerned about how sorghum-sudangrass hybrids for silage will affect their feed grain acreage in 1965 should check with their county ASCS office before planting.

Hybrids yield large tonnages of silage per acre, but the silage cannot be expected to contain the feeding value of good corn silage. There is a tendency to harvest hybrids for silage before they head, and get two or more cuttings in a season. Plant moisture is too high at such a stage to make good quality silage and such a crop should be treated as any other hay crop silage. It should be wilted or have preservatives added. If the crop is harvested when the seeds are in the dough stage, much better feeding value will result. Forage sorghums normally make better quality silage than sorghum-sudangrass hybrids, but corn makes better silage than forage sorghums.

Seeding rates are usually given by the company producing a particular hybrid and may be different for one hybrid than for another. Seeding rates may be as high as 25 to 30 pounds per acre in broadcast or drilled plantings and 10 to 20 pounds per acre in rows. Both methods of planting have been used successfully and will depend largely on a farmer's equipment.

Fertilization rates for sudangrass or the hybrids are normally about the same as for corn in the same area.

Trials over the past 3 years compared some sorghum-sudangrass hybrids with Piper sudangrass. In 1962 and 1963, with just a few hybrids compared with Piper at the grazing stage at St. Paul, no great differences were noted in yield of dry matter. Piper was consistently lower in prussic acid content than the hybrids and showed a slightly faster recovery after grazing.

Sorghum-sudangrass hybrids at the grazing stage will contain about 10 to 15 percent crude protein, whereas alfalfa-grass pasture will contain about 16 to 20 percent. At the silage stage sorghum-sudangrass hybrids contain about 7 to 9 percent crude protein while alfalfa hay contains about 14 to 16 percent.

Yields and other characteristics of sorghum-sudangrass hybrids and sudangrasses at Rosemount in 1964 are shown in the table. Because of the severe drought the full yielding capability of individual hybrids and varieties was not realized. The greatest differences were found in prussic acid content (HCN) and maturity as indicated by the percent heading note.

The HCN content of Piper and Trudan were distinctly lower than the sorghum-sudangrass hybrids. However, the HCN contents of the sorghum-sudangrass hybrids, except Excel F-33, are in a range safe for grazing with proper precautions.

None—not even Piper and Trudan—should be grazed before they are 18 inches tall. The higher the HCN content of a variety the taller it should be before the first grazing. Also, avoid grazing short regrowth after the crop has been severely stunted by frost or other causes.

Making silage or hay of sudangrass will practically eliminate the possibility of prussic acid poisoning. Drying, as in hay curing; or fermentation, as in si-

(Continued on next page)

Table 1. Yields and other characteristics of sudangrass varieties and sorghum-sudangrass hybrids at the grazing, green feeding, and silage stages at Rosemount in 1964*

Variety	Tons per acre at 15% moisture: 2 cuts grazing	2 cuts green feed	1 cut silage	Height in inches of first cut: Grazing	Green feed	Silage	Mg. HCN per 100 gm. dry matter: Grazing	Silage	Percent heading when cut: Grazing	Silage
sudangrasses										
Piper	2.0	2.5	2.3	40	66	83	11	98		
Trudan (hybrid)	2.3	2.5	3.6	41	74	88	13	98		
sorghum-sudangrass hybrids										
DeKalb X1751	1.8	2.2	3.1	39	70	87	45	5		
Green Gro	2.1	2.2	2.6	41	65	84	51	5		
Sudax Sx11	2.1	3.0	2.9	39	73	82	55	87		
Excel Grazer	2.4	2.2	3.1	41	75	80	45	15		
Excel F-33	1.7	2.1	2.1	33	59	61	108	0		
RP Mor Su	1.9	2.2	2.6	40	78	92	45	77		
NB 280 S	2.3	2.5	2.9	41	74	91	25	95		
Sweet Sioux	2.0	2.8	2.3	41	78	92	39	35		
Greenlan	2.1	2.5	2.8	40	69	81	43	5		
Lindsey/Funk G-77F	2.2	2.5	2.6	44	74	83	40	67		
TE Haygrazer	1.9	2.2	2.6	38	66	84	60	5		
TE Grazemaster	2.1	3.1	2.3	39	72	84	52	0		
Hydan 37	2.0	2.6	2.5	41	72	86	41	85		
Volkman S 100	2.3	2.6	2.5	42	75	92	48	94		

* Plots drilled (6-inch rows) at 30 pounds per acre for the grazed and green feeding and 15 pounds per acre for silage.

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lage-making, will dissipate most of the HCN. Forage and grain sorghums are very high in HCN content. Waconia orange sorgo analyzed at the same time as the sudangrasses and hybrids had an HCN content of 186 milligrams per 100 grams dry matter. Sorghums of this type are therefore dangerous to graze.

The maturity of the sorghum-sudangrass hybrids varied widely. Because of the severe drought all of them were cut on August 7. At this time the sudangrasses were 98 percent headed. The sorghum-sudangrass hybrids ranged from no heading to 95 percent heading in the Nebraska hybrid NB280S. In a normal year the proper stage to cut for silage would be when the seeds are filled out and in the soft dough stage. How many of these hybrids would have attained this stage before frost cannot be predicted from these data.

As with any grass crop, nitrates can accumulate in sorghum-sudangrass hybrids. When grown on land with high rates of applied nitrogen, or following legumes or fallow, dangerous accumulations can take place if normal growth is hindered because of drought, hail, insects, etc. All sorghums are more susceptible to these accumulations than corn or small grains.

The symptoms of nitrate poisoning and prussic acid poisoning in livestock are the same. But nitrates accumulate in stems while HCN is found mainly in leaves. During conditions which cause nitrate buildup, feed the crop sparingly and with feeds that are known to be low in nitrate.

Summary

1. Sudan and sorghum-sudangrass hybrids are excellent supplementary forage producers for the July-August dry period.
2. At the grazing stage the sorghum-sudangrass hybrids are similar in yield to the sudangrasses. At the silage stage they will generally yield more. But at the silage stage, forage sorghums will yield as much or more than the sorghum-sudangrass hybrids and make better quality silage. Corn is still the best crop for high yield of high-quality silage.
3. Sorghum-sudangrass hybrids are higher in prussic acid content than is Piper sudangrass, but most of them are in the safe-to-graze range. None should be grazed before 18 inches in height and short regrowth should not be grazed.

Weed Control in 1965

Gerald R. Miller

Improved weed control may be the surest way to increase crop profits in 1965. Researchers have estimated that in the average corn or soybean field, yields are reduced 10 to 15 percent by the weeds left after good control practices are used. Under the dry conditions of 1964, losses were as much as 40 to 50 bushels of corn per acre in some Minnesota fields due to heavy stands of giant foxtail.

Weeds cause other losses, too. Harvest losses are greater where weeds are present. Weeds cause added wear and tear on machinery and loss of valuable time in harvesting. Crop quality is lowered by the presence of weeds. Hay and pasture quality is lowered by weeds. Weed seeds may contaminate crop seed fields, making it impossible to market the crop for seed. Growers who are "weed conscious" this spring can expect to reap more profits next fall.

Timely and careful cultural practices are the foundations of weed control programs on most farms. It may be necessary to supplement cultural practices with chemicals to control problem weed situations. Some of the newer chemicals require special application techniques, and rates are critical. It is important that crop growers understand how to use chemicals in 1965 to supplement cultural practices. Chemicals are another tool to use for increased profits, but they must be used properly.

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Cultural Practices

Cultural practices are still the most practical means of weed control in most cropping systems. Careful attention to cultural practices and timeliness of operations will keep many weed problems under control.

Cultural practices that help control weeds include seedbed preparation, establishment of adequate stands, timely cultivations, and mowing. Early germinating weeds can be destroyed with a disk, field cultivator, or harrow before planting if conventional tillage is used. Minimum tillage methods that leave the space between the rows rough also discourage weed growth.

Early cultivations are most effective for killing weeds. Use the rotary hoe or harrow after weed seeds have germinated and before or as soon as the weeds appear above the soil surface. Weeds are easiest killed when in this very tender stage. Row cultivators work best, too, if used while weeds are still very small. Shallow cultivation prevents root pruning and brings fewer weed seeds to the surface. Use a rotary hoe or cultivator as soon as weeds appear, even if preemergence applications have been used.

You may also want to consider narrow rows to shade the ground earlier and help control weed growth. Adequate stands will also shade out many weeds. Plant the highest populations suited to your moisture and fertility conditions. Also, use the best seeding practices available for establishing dense stands of grasses and legumes.

Chemicals

What results can you expect from preemergence chemicals in 1965? Several factors influence the performance of preemergence herbicides. Included are rainfall, temperature, soil type, weed species, and accuracy of application.

Tests have been conducted for several years by the University of Minnesota agronomists in cooperation with county agricultural agents and farmers. The performance of several preemergence herbicides in these tests is given in the table. The results shown are an average of 74 to 300 trials for the different treatments. Chemicals were broadcast on 1/100-acre plots and not cultivated. Ratings were based on: good = 75 percent or better control; fair = 50 to 75 percent control; poor = less than 50 percent control.

You can see that most of the chemicals gave good control in one-half to three-fourths of the trials. The same treatments gave poor control in one-tenth to one-fourth of the trials. Results varied from year to year and field to field. Preemergence chemicals are good insurance against early season weed competition and rainy weather that may delay cultivating. But, to get top yields, preemergence treatments should be supplemented with early cultivation or postemergence sprays. Most preemergence chemicals are applied in a band over the row to keep down costs. Cultivation and postemergence sprays will control weeds between rows.

New Chemicals

Some new chemicals to help fight the weed war are available this year. You may wish to try some of these materials in a small area.

Ramrod is a recently developed herbicide chemically related to Randox. It has given better grass control than Randox in University of Minnesota research trials and is more persistent. Suggested rates are 4 to 5 pounds of active ingredient per acre.

The chemical is less irritable than Randox but should be handled carefully. It is available as a wettable powder or granules. Corn and soybeans are tolerant to Ramrod, but the chemical is cleared for use on corn for grain only. Do not feed or graze treated forage. Clearance has not been obtained for use on soybeans.

Amiben has received clearance for use on corn at 2 pounds per acre. In limited research trials, amiben at this rate has caused some early injury to corn and has given erratic weed control.

Trifluralin (Treflan) is a chemical that was cleared in 1964 for use on soybeans. It has given good control of annual weeds where properly applied. Ragweed, cocklebur, velvet leaf, and other deep-germinating weeds were not controlled. Proper application of this material is very important. Apply the chemical before planting. Then, thoroughly incorporate it into the soil. Proper incorporation can be accomplished by double disking twice at right angles or by other methods which thoroughly mix the chemical with the top 3 inches of soil.

Combinations of chemicals are becoming more popular. A combination of atrazine and linuron (Lorox) in a 1 to 1 ratio is now cleared for use on corn as a preemergence application. This combination has looked promising in limited research trials. The major advantage is the potential for reducing carryover of atrazine into the following year. Rates vary from ½ to 1½ pounds per acre of each chemical according to soil type. Be sure you use the rate suggested for your particular soil. Do not use this combination as an early postemergence treatment, as excessive injury will result. Also, the combination is less effective than atrazine alone on quackgrass.

A combination of dicamba (Banvel-D) and MCPA is cleared for use on wheat. The combination controls hard-to-kill broad-leaved weeds such as wild buckwheat and smartweed in addition to controlling mustard. Apply this combination when wheat has two to five leaves and weeds are very small. Timeliness of application is very important to avoid crop injury and get good weed control. This combination will kill legumes.

Weed Control Bulletin

For complete weed control information, see Extension Folder 212, "Cultural and Chemical Weed Control in Field Crops" (1965). Your county agent has copies.

Chemical Residues

Atrazine and simazine, chemicals that provide season-long weed control in corn, often carry over into the following year. Residues may be expected to be greater than usual in years when rainfall is below average. 1964 was a very dry year in much of Minnesota. The safest practice is to plant corn in fields that were treated with atrazine or simazine last year; avoid planting oats, soybeans, sugar beets, and other sensitive crops in these fields.

You can decrease the chances of having harmful residues in the soil by making sure you apply no more than the amount recommended for your soil type. Agitate the chemical well in the spray tank to insure uniform application. It may be a good practice in some areas to avoid the use of atrazine the year before planting crops other than corn. Chemical rotation that fits crop rotation should be considered.

Use of band applications rather than broadcast applications will also reduce residues. Plowing and thorough tillage of the soil prior to planting susceptible crops will help lower the residue level in the soil.

Use of a combination of chemicals instead of atrazine alone may help avoid residue problems. A combination of atrazine and linuron is now cleared for use on corn as a preemergence spray. (See discussion above.) Other combinations are now being tested.

In a few cases, Randox-T has carried over into the following season, causing soybean damage. Usually these cases have involved excessive rates of application. Where the recommended rates are used, it is doubtful that damage would be enough to reduce yields.

Safe Handling

Keep in mind when using herbicides that these chemicals may not do the intended job if improperly used. Also, if handled carelessly, the chemical can cause bodily injury to the user. Here are a few simple precautions that will help the user get favorable results and protection:

1. Always follow the label precautions carefully. This helps protect you, avoids crop injury, and prevents harmful residues in food and feed crops.
2. Use herbicides only on those crops for which they are specifically approved and recommended.
3. Use only recommended amounts. Applying too much herbicide is costly, may damage the crop, and may be unsafe if the crop is to be used for food or feed.
4. Apply herbicides only at times specified on the label. Observe the recommended intervals between treatments and pasturing or harvesting of crops.
5. Wear goggles, rubber gloves, and other protective clothing as recommended on the label.
6. Guard against possible injury to nearby susceptible plants.
7. Store chemicals in a locked room away from feed, seed, animals, and children.
8. To dispose of used herbicide containers, rinse the containers, cut holes in them with an axe or pick, then bury the containers. Do not burn herbicide containers. The fumes may be toxic.

Table 1. Evaluation of weed control by preemergence chemicals in county demonstration trials for several years

Chemical	Rate	Degree of weed control: Grasses — Percent of trials in each class: Good	Fair	Poor	Broad-leaved weeds — Percent of trials in each class: Good	Fair	Poor
	lb./acre			CORN			
Randox	4	41	35	25	11	26	63
Randox-T	3½ + 7	46	36	19	43	33	24
Randox	5	46	33	21	17	25	58
Atrazine	2	53	27	19	68	20	12
Atrazine	3	74	17	9	83	10	6
Atrazine (early post-emergence)	3	67	16	17	82	8	9
Lorox	2	49	24	27	56	20	25
Lorox	3	57	25	16	65	22	13
				SOYBEANS			
Randox	4	55	30	17	15	27	59
Randox	5	60	30	9	17	32	52
Amiben	2	52	31	16	58	21	21
Amiben	3	72	20	9	72	19	9
Lorox	2	53	30	18	67	18	14

WESTERN CORN ROOTWORM CONTINUES TO SPREAD IN MINNESOTA

John Lofgren

The Western corn rootworm continued its expected march into a wider area of Southwest Minnesota in 1964, leading to damaging infestations in Rock, Nobles, Jackson, Pipestone, Murray, and Cottonwood Counties.

Surveys of adult beetles indicate populations high enough to cause economic infestations next summer in an area south of the Minnesota River from Lac qui Parle County on the north down to the Martin-Faribault County line on the east.

There's also chance that some local fields beyond these boundaries may have damaging infestations in 1965.

Crop rotation seems to be the best way to minimize losses from Western corn rootworm. This principle was demonstrated in a dramatic way in many fields during 1964. Yet, with extremely high beetle populations, first-year corn will sometimes have rootworm infestations. Such infestations seem more likely in land that had alfalfa, weedy stubble, or soil bank land next to a heavily attacked cornfield the previous year.

Early planted corn, with a root system established by the time rootworms begin to feed, tends to be damaged less than small, late planted corn. But there seems to be no consistent tendency for infestations to be heavier or lighter on land tilled in the fall, rather than in the spring.

There is usually less damage in hybrids known to resist lodging or able to regenerate roots vigorously following injury. But so far as we know, no rootworm-resistant lines of corn are available.

Also, the rootworm problem is tied somewhat to weather conditions. Drought at the time of heaviest root damage by the worms will result in more severe damage and more economic loss than is usually the case with adequate moisture.

More infestations on second-year corn were observed this year than in the past, so many corn growers probably will not be able to get by for 2 years of corn before using chemical control.

John Lofgren is a professor and extension entomologist.

Chemical Control

Western corn rootworm is resistant to aldrin and heptachlor; where economic infestations are expected in 1965, farmers are advised to use a phosphate insecticide when corn is raised on the same field for the second year.

Chemical effects were rather variable in 1964. Diazinon, parathion, Thimet, 4072, and Di-Syston are currently approved materials.

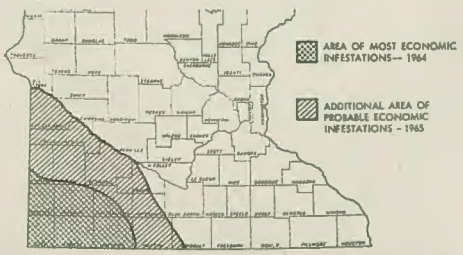
Current evidence suggests that these chemicals do a fairly good job with light to moderate infestations, but are not satisfactory against a heavy attack. Usually 25 or more worms per plant will cause significant economic loss.

Suppose a particular phosphate gives 75 percent control with a natural infestation of 50 worms per plant. Then the chemical will reduce the infestation to about 13 or less worms per plant, and some damage will occur. However, the grower will probably get his money's worth from the chemical, other things equal.

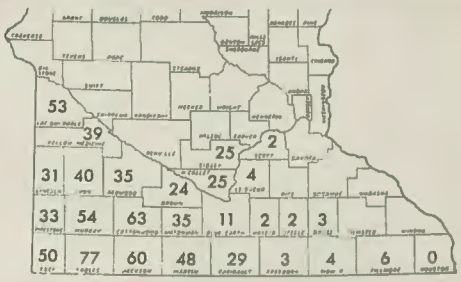
With a potential of 120 worms per plant, 75 percent control would leave 30 worms per plant, and the field might still suffer heavy damage.

The best way to apply the phosphate seems to be in the granular formulation in a band 4 to 6 inches wide just covered with soil and placed over the row at planting time. This calls for a properly calibrated and adjusted applicator mounted on the corn planter. A full pound of actual chemical per acre is needed for the job.

Other methods, such as postemergence treatment at the base of the stalks or adding chemical along with starter fertilizer, may work in some cases. But since results in these chemicals are variable anyway, a corn grower is well advised to increase his chances of getting a good job by applying the insecticide as precisely as he can with a planter attachment.



Western corn rootworm—areas of infestation in Minnesota.



Survey of Western corn rootworm adults, 1964. Average percentages of Western adults in total population of rootworm adults observed (Data from Minnesota Department of Agriculture).

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