

THE THIRSTY LAND

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DROUGHT: A SPECIAL REPORT



Merle Ankrum of Highmore, S.D., finds only parched soil where his winter wheat field was planted.

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This special section on drought in the Midwest is the work of eight reporters and three photographers. Chuck Offenburger did the work on South Dakota; Richard Gibson did Minnesota; Don Muhm, Iowa; Arlo Jacobson, Nebraska; James O'Shea, Missouri; Otto Knauth, weather and assorted other contributions; Veryl Sanderson, Illinois and several other stories; and Eileen Ogintz, the rest of the states. Thomas DeFeo took the pictures in South Dakota and Minnesota; Frank Folwell took those from Missouri and the Mississippi River; Jervas Baldwin contributed a picture of "snirt."

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For now, winter dormancy has calmed a violence that's gone on beneath us.

In scattered areas of the Midwest, the dry conditions of summer and fall sent roots on deep, divisive routes through the soil — or horizontally through thick cement walls of cisterns — to moisture.

The harvest, in some places bountiful, sucked the ground drier yet.

Hope grew for early-winter moisture, but little came. And now, snowfall is far below normal. Snow never contributes much to ground water, but it is counted upon to feed streams and protect the soil against wind erosion.

Drought?

After an extensive survey of the Midwest by Register staff members in recent weeks, we answer:

- In Minnesota and South Dakota — Yes, the worst of the century.
- In Iowa, Missouri, Nebraska, Wisconsin, North Dakota, Oklahoma, Colorado and Kansas — Maybe.
- In Illinois, Indiana and Texas — No.

Beyond the region, the entire western half of the nation is drier than normal, with large areas of California claiming drought. And some provinces in Canada, according to dispatches, would fit our "maybe" category.

In 1976, farmer applications to the U.S. Department of Agriculture (USDA) for disaster payments rose by 48 per cent, largely because of dryness. And yet, the USDA also reported record crops of corn and wheat.

The seemingly paradoxical situation is much the same in Iowa, where in a dry year, the average corn yield per acre was 90 bushels — which is down from the record yields of the early 1970s, but still not bad. And one corn grower, Eldon Prybil, of Iowa City, boasted the modern state contest record yield of 209.82 bushels per acre.

But there's good reason why federal agriculture officials are now considering more extensive drought relief programs: Good harvests on already-dry land have left the ground badly depleted of moisture.

Why tell the story now? We certainly don't do it to scare anyone, or to predict drought. In fact, Register Farm Editor Don Muhm has it figured that rain is coming — that the drought, if we had one, is gone. Still, we think it important to assess the condition we in the Midwest find ourselves in as we head into what could be one of the most pivotal agriculture periods in 20 years or more. What happens will affect all of us, farmers and townsmen alike.

The general picture in the farm belt is that dryness has reduced crop yields the past three years. It's come at a time when livestock producers have been taking staggering losses in depressed markets.

Farmers have been forced to refinance their precious land to obtain operating money, and as a result, farm debt is soaring. Says South Dakota state agriculture official Al Griffiths: "I think agriculture throughout the upper Midwest has good reason to be skeptic."

But not just agriculture. Farm suppliers — implement dealers, for example — are already feeling the pinch of decreased farmer spending, and it threatens to spread up and down the mainstreets of the Midwest if conditions don't change.

The economies of most Midwest states are diversified between agriculture and industry. It's a pet contention that agriculture serves as a steady influence, protecting the region against the periodic ups and downs that more industrialized areas suffer. But, as the Minneapolis Tribune recently noted, "If drought continues, the old shock absorber could be the source of shock waves."

Meanwhile, many towns and cities are reporting depleted water supplies and are imposing strict conservation measures. In some places, "water fights" — legal battles over who has rights to what water — are taking shape.

And outdoor recreational activities — especially in Minnesota and Wisconsin — are being tightly controlled for fear of fires caused by careless people.

Why? Rainfall shortage is the obvious answer; Iowa, for example, in 1976 had the driest May-to-December in the 104 years of climatic records.

But there's another answer, too. Human water consumption has risen almost incredibly.

Total U.S. water withdrawals have multiplied nine times since 1900 to meet today's demand of 160 gallons per person a day, compared to about 10 gallons per person daily around the turn of the century.

"When the well's dry, we know the worth of water," Benjamin Franklin once said. Midwesterners are drinking to that.

Drought, while such a serious phenomenon, is a fickle one, too.

In agriculture, the timing of rain is usually more important than the amount received. An example:

Students from Kirkwood Community College of Cedar Rapids made \$70 profit per acre raising corn in 1976; the year before, they lost nearly \$10 per acre. The reason: In the critical months of June and July in 1976, the area received 1.8 inches more rainfall than in the same period of 1975. That was the difference between 115-bushel corn in 1976 and 89-bushel corn the year before. A 26-bushel-per-acre difference because of less than two inches of rain!

Why does drought occur?

One of the most common theories is that spots on the sun affect weather in such a way that droughts occur in 20-year cycles. Says Robert Duxbury, South Dakota Secretary of Agriculture: "I don't understand the theory, but I like it, because from what I hear the sun spots are moving the drought center away from us. That's good enough for me."

And then there's the Raymond Spiegel theory. Spiegel, in the midst of a very localized drought in 1968 in his home area of Hamburg, Ia., philosophized that "some have just had it too damned good the last few years, and the good Lord thought He'd take care of them."

On such theories, it seems one's got as many disciples as the next, and no two people seem to agree on a definition.

But whatever it is, drought doesn't seem to stand and be recognized as it once did.

How was it? John Steinbeck, in *The Grapes of Wrath*, on the 1930s:

"... as the sharp sun struck day after day, the leaves of the young corn became less stiff and erect; they bent in a curve at first, and then, as the central ribs of strength grew weak, each leaf tilted downward ... The air was thin and the sky more pale; and every day the earth paled ... Every moving thing lifted the dust into the air: walking man lifted a thin layer as high as his waist, and a wagon lifted the dust as high as the fence tops, and an automobile boiled a cloud behind it. The dust was long in settling back again ... The dawn came, but no day. In the gray sky, a red sun appeared, a dim red circle that gave a little light, like dusk; and as that day advanced, the dusk slipped back toward darkness, and the wind cried and whimpered over the fallen corn. Men and women huddled in their houses, and they tied handkerchiefs over their noses when they went out, and wore goggles to protect their eyes ..."

Many things came together to make the 1930s drought the worst economic disaster in U.S. agricultural history.

Rainfall had been above average over a large area of the Great Basin and Southern Plains during the

show it was the driest period in the Southwest in some 700 years.

But the Dust Bowl miseries of the '30s were missing — the national economy was sound, federal relief programs were in good working order and those who had to leave the farms had little difficulty finding work elsewhere.

Through the worst of the drought — from 1953 through 1956 — Iowa's corn crop averaged 53, 54, 48 and 53 bushels per acre.

Why the dramatic yield differences from the 1930s? Improved farming, and it's improved even more in the years since.

In fact, the Omaha World-Herald recently characterized drought as now having been "de-fanged" by better crop hybrids, more fertilization, improved weed and pest control, irrigation and increased conservation of soil and water.

But don't go to Minnesota and South Dakota today and argue that technological advancement has made us immune.

In many ways, costs of technology — and the resulting costs of equipping for it — make us more panicky about drought or dryness than we were anytime previously.

Inflation of the 1970s made many farmers millionaires, at least on paper. For example, good crop-producing Iowa land that 15 years ago brought \$300 an acre is now bringing \$3,000 per acre, or more. Similar land value increases have occurred in other states as well.

Credit has become more readily available as farmers have increased their net worth statements. And their sudden wealth has often forced them to take advantage of the credit situation and expand — if for no other reason than tax deductions.

More land, more technology, more, more, more.

And add the costs of highly-sophisticated machinery, automated feedlots, livestock confinement buildings and the other Buck Rogers trappings of modern farming.

Understand the increasing pressure on farmers' cash flow?

The USDA says total farm debt as of Jan. 1 was up 12 per cent to \$101.6 billion. Some \$57 billion of that is reported as land debt, and the USDA predicts a record one-year rise of \$7 billion in that category this year.

Plainly, the farm debt structure can ill-afford mediocrity in productivity and earnings.

But as dry weather has cut into crop yields, farm income has fallen. Loans still come due, however, and farmers find themselves in a cash bind.

The ability of farmers to refinance their land — which is there only because of appreciating land values — is the biggest reason that there as yet have been no farm foreclosures in the hardest-hit areas of drought.

Lenders apparently are still confident — at least in Iowa — that farm loans are solid investments.

Terry Franci, agricultural economist at the Seventh District Federal Reserve Bank in Chicago, Ill., says, "Frankly, I think the spiraling land prices have outpaced the gains in loans. The value is there."

"I'm not saying it won't be a problem if it (dryness) continues for some time," he adds.

In the less severe areas of drought in the Midwest, the most plaguing problem dryness has imposed is uncertainty. Will it spread? Will it intensify? Will it end?

It leaves most Midwestern farmers — at a time of year when planting decisions are normally being firmed — with the grossest sort of indecision about what to do.

The way they handle such adversity is an intriguing part of the farm ethic.

"You can't take the attitude that it isn't going to rain and that we're all going to go broke," one South Dakotan said. "If you do, you're beat already."

And a Minnesota implement dealer says he's putting up a new building in 1977 because he thinks like the farmer. "The progressive farmer doesn't do business from one year to the next," he says, "and neither do I. You have to be optimistic. Half this is a game of mental attitude."

Joe Bohlen, an Iowa State University sociologist who's studied farmer attitudes for over 25 years, says the top farmers would take drought in stride. "They'll say, 'I'm not running ... I'll be here when it's over,'" Bohlen says.

"Meanwhile, they're going to play the odds, calculate the risks, get all the information they can and take every advantage of it they can."

On the other end of the farmer spectrum, he says, "you've got the traditionalists, the fatalists, who think man never controls anything. They look on it as an act of God and they're just going to go on doing what they're doing, because that's all they know to do."

Finally, the best advice we can give is the oldest advice in these situations: Pray for rain.



preceding decade, encouraging farmers to plow up and plant lands that would normally be classified as desert.

With the cover of grass removed, these lands quickly fell prey to the rising winds that finally created the Dust Bowl. At its peak, this Dust Bowl covered 50 million acres and the clouds of dust were visible as far east as New York City.

In Iowa, droughts were most severe in 1934 and 1936, primarily in southern and western sections. State average corn yields were 28 bushels per acre in 1934 and 20 bushels in 1936 — the lowest since the 15 bushels per acre crop of 1894. Farm foreclosures were the daily fare — some being carried out under the guard of state troops.

Forty counties in the state were declared disaster areas in 1936, along with 40 in Nebraska and 97 in Missouri.

Concurrent with the drought, the nation was in the throes of economic crisis: The New Deal had not yet solved the Great Depression. With city people as strapped as the farmers there were simply not enough jobs and not enough relief to go around. Thus began the great Twentieth Century migration to a new life in California.

Yet for all the severity of the 1930s drought, weather records show that the drought of the 1950s was more severe. In fact, tree-ring records in Arizona

Iowa's outlook: uncertain

"Is Iowa dry?" goes a story that was making the rounds in western Iowa last summer. "Well, we used to stand in the fields and listen to the corn grow; now we stand and listen to it gasp for water."

Still, the thirsty land was generous to most Iowans again, producing an average of 90 bushels of corn an acre. In fact, the Iowa soil has proven remarkably resilient over the years, time after time bouncing back from one weather disaster or another. So the Iowa farmers' faith runs deep.

This year Iowa finds itself on an uncertain frontier, sandwiched between the drought of Minnesota and South Dakota and the "garden spot" conditions of Illinois. Which way will Iowa go?

That's the main topic of conversation when farmers or townsmen meet in their gathering places across the state these days. Farmers must make crucial decisions in the weeks ahead concerning what to plant, what seed to order and how thickly to plant it. Their success in guessing will have an important bearing not only on their pocketbooks, but on those of townsmen, tradesmen, retailers, implement dealers, bankers, consumers, and everyone else in Iowa's agriculture-based economy.

The land has been generous over the years, and most Iowans seem to feel that it will be so again. But they look toward Minnesota and South Dakota, and they wonder.

Wells and farm ponds are running dry in southwest Iowa, and farmers have been turning in increasing numbers to hauling water from any source they can find.

Some 75 to 100 Taylor County farmers had been buying water from the county seat town of Bedford, but the city posted notice at the end of January that its own reservoir was running low and that it could not supply any additional customers.

So the farmers turned to the State Office of Disaster Services, which arranged with the Iowa Conservation Commission to pump water out of Lake of Three Fires, a state park lake just north of Bedford. An 8-inch hole was cut in the ice and a pump supplied by the Disaster Office put into operation. About 2,800 gallons were pumped in the first week.

John Stokes, chief of lands and waters for the Conservation Commission, said the relatively small amount of water pumped so far will not damage the lake, but that a drop of two feet or so in the lake level could harm fish life.

Conservation Director Fred Prierwert said that other state park lakes would be available for pumping water, if needed. "Domestic water is the highest and best use," Prierwert said, "and we'll do our best to make it available. But we hope we don't have to hurt the parks doing it."

But pumping water out of lakes is only a short-term measure. Iowa's three-year dry spell also has seen a rush of applications for irrigation permits.

The Iowa Natural Resources Council received 553 applications in 1976 — more than 10 times the usual number, according to Louis Gieseke, state water commissioner for the council.

So far in 1977, applications total 77, almost twice the usual number filed in a year, he said.

Because of a council personnel shortage a backlog of 650 cases has piled up, Gieseke said.

By far the greatest use of water for irrigation has come in western Iowa — especially in the sandy bottomlands of the Missouri River.

It is generally felt that a large part of Iowa is unsuited to irrigation because of the peculiarities of soil types and other factors, according to George R. Hallberg, chief research geologist with the Iowa Geological Survey at Iowa City. In addition, there are only a few areas of the state where sufficient water can be pumped at the desired rate for crop production.

The dryness also has set the stage for potentially serious wind erosion, according to William H. Greiner, director of the Department of Soil Conservation.

The dry fall permitted an unusually large amount of fall plowing and related field work in preparation for 1977 crops, he said.

This means that a higher portion of the state's crop land is vulnerable to soil losses by wind erosion this winter and spring.

Particularly vulnerable, Greiner added, are fields where soybeans were harvested last fall.

"There's something about the soybean," Greiner said. "It really increases soil erosion."

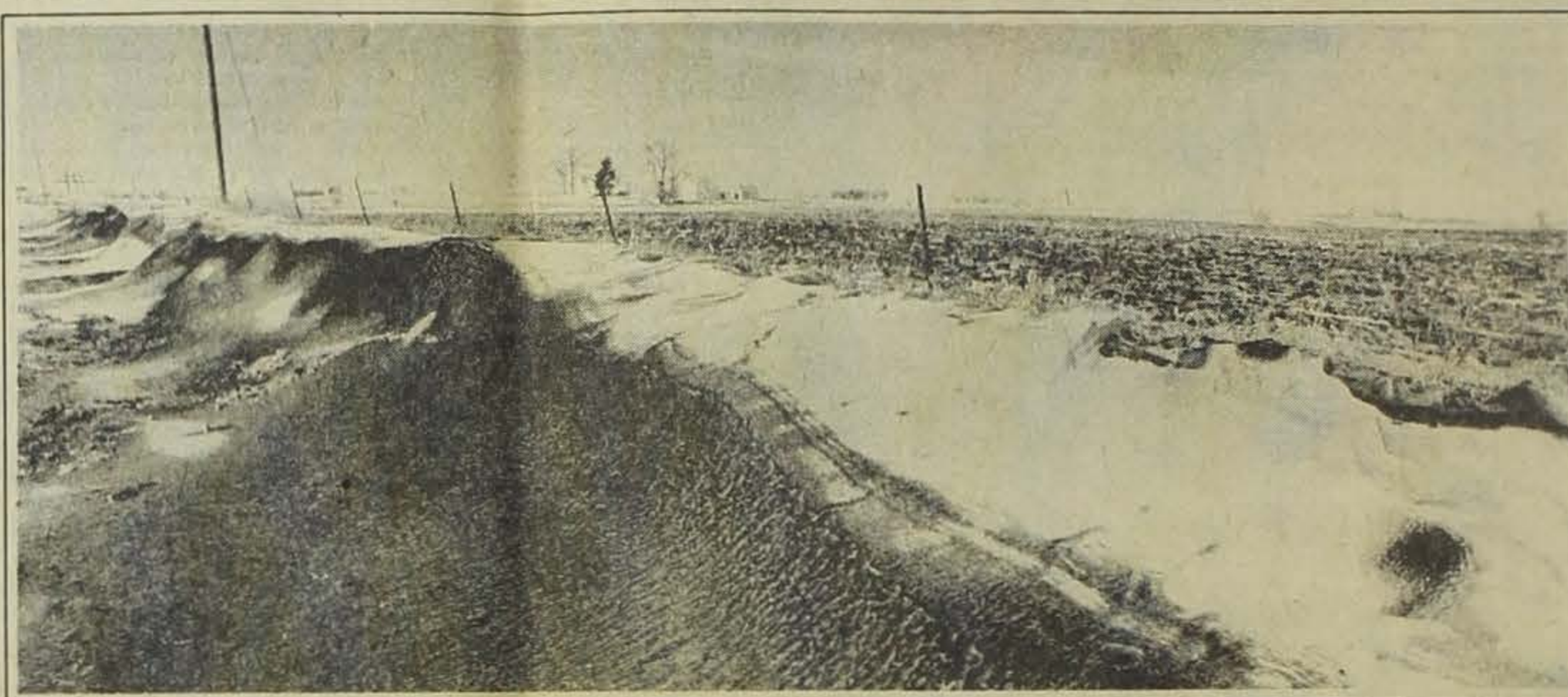
How long is Iowa going to stay dry? State Climatologist Paul J. Waite of the Iowa Department of Agriculture won't hazard a guess.

He does point out that drought condi-



Hayrunning to Minnesota

A semi load of hay from Hanlontown is checked before auction in LuVerne, Minn. A federal transportation subsidy for Minnesota and South Dakota has driven up the cost of hay for states not included in the subsidy. As a result, farmers from Midwestern states are bypassing Iowa and selling their hay in Minnesota and South Dakota. The subsidy provides for 80 per cent of the transportation costs up to \$50. Right: Soil erosion along Highway 7 west of Pomeroy turns freshly drifted snow into sea of dirt. The unattractive result is adding a new word to the language of the countryside: "snirt."



tions have been present in Iowa the past three years, beginning in western and southwestern parts of the state in 1974.

Each year since then, a shortage of rain has cut crop yields. A continued shortage of moisture this year would add more problems to a farm economy where the cattle market has been extremely low for nearly three years, and where large numbers of market hogs are expected to depress slaughter prices.

How much rain is needed right now to get Iowa's subsoil moisture back to "normal"?

Iowa State University's long-time climatologist, Dr. Robert H. Shaw, says "there's no definite figure."

"Twenty years of research (from 1951 through 1970) indicate that if we can start April 15 with from 6 to 7 inches of subsoil moisture, it's going to be a pretty good crop year."

Last November there were only 1 to 3 inches of moisture in the western part of the state, and 5 to 7 inches in the southeastern portion.

Currently, Shaw reports subsoil moisture in the northwest half of Iowa is not in good shape for 1977. The south central and southeastern areas of Iowa look good, and Shaw says he can be optimistic about crop prospects assuming normal weather this spring, summer and fall.

But for the northwest, Shaw adds, the chances are slim that the needed subsoil moisture reserves can be built up or replenished by Apr. 15.

"You're going to need a lot of things happening just right," he said about the northwest.

Such as an early thaw, followed by heavy, wet snows or regular, slow spring rains.

One sign of what farmers think about crop prospects came in late January when the U.S. Department of Agriculture (USDA) released its 1977 planting intentions report.

Surprisingly, a larger corn acreage is seen in Iowa and nationally this year, despite the concern over another dry growing season.

The expected boost in soybean plantings — generally considered a better risk in dry years — wasn't as great as some observers had expected, especially since prices rose for that commodity in recent weeks.

Corn acreage in Iowa is estimated to be up one per cent this year. But that's 100,000 acres more corn. Nationally, corn acreage will be increased only one-half of one per cent. That boost comes after a record 6.2-billion-bushel U.S. corn crop was harvested in 1976.

Corn acreage was up sharply last year in response to higher prices and brisk export demand for grain.

What about 1977? Several top Iowa farmers are waiting to see what the spring brings.

Eldon Prybil of Iowa City, the Iowa Master Corn Grower of 1976 with 209.82 bushels per acre from a contest plot, is worried about subsoil moisture.

He plans two changes if spring rains don't arrive ahead of planting — reducing the plant density per acre, and switching to a larger acreage of soybeans.

"Soybeans do a little better than corn in a dry year," he said.

With corn, Prybil will reduce the thickness of planting by a couple of thousand seeds per acre, on the theory that more soil nutrients and moisture will then be available to the seeds that are planted.

Duayne Seberg of Mount Pleasant, who harvested a contest field of 197.35 bushels of corn per acre last year, says he hasn't decided yet what he will do.

"I've got my fields fall-plowed and chiseled and I can go either way in the spring," he said.

Byron Hill of Manly can attest to the importance of a good rain for corn yields. Last year an extra 3.3-inch rain fell on the contest field from which he harvested 169.4 bushels per acre. A nearby field missed by that rain yielded only 55 per acre.

Iowa's champion soybean grower, Walter Dengler of Davenport, says that

if the weather continues dry he'll cut his corn plantings by 8 to 9 per cent and boost soybean plantings by as much as 16 per cent.

"We're very dry in eastern Iowa now," Dengler said. "The (drainage) tile and creeks aren't running at all. They're dry."

Iowa State University extension agronomist Dr. Harvey E. Thompson is one specialist who sees little point in getting excited in mid-winter about crop prospects.

"I just don't think there's any point in anybody panicking yet," Thompson said. "We had a little better (subsoil) moisture last year, and then we got eight inches of rain in April."

"Those heavy April rains gave us enough subsoil moisture to come through with a crop in Iowa even though there weren't good rains after that," he said.

His advice to Iowa farmers is to

make normal cropping plans for normal conditions.

Climatologist Waite and others point out that even though 1976 was one of the driest years on record, a respectable average corn yield of 90 bushels per acre was obtained.

That yield was nearly three times the average corn yield in drought-hit South Dakota, and a third more than was produced on the average in Missouri.

It was the second consecutive year Iowa farmers averaged 90 bushels per acre of corn. The Iowa record average corn yield of 116 bushels was set in 1972.

But the 90-bushel average yield is 10 bushels higher than the Iowa average of 1974, the first year of the current dry cycle, and a year when killing frosts came in early September, hurting yields.

During the drought years of the mid-1950s Iowa corn yields were substantially lower. In 1954, the first year of that drought, the Iowa average corn yield was 54.5 bushels per acre with a total crop of 545 million bushels.

In 1955, the average yield was 48.5 bushels and the state harvest was only 499 million bushels.

In 1971, Iowa corn growers produced their first 100-bushel average yield (102 that year), and the first of five billion-bushel corn crops.

The dramatic upswing in Iowa farmland prices closely parallels corn yields, except for the last three years. In the early 1970s, when corn harvests boomed and export sales soared, land prices started to skyrocket.

At the end of 1976, Iowa farmland averaged \$1,231 an acre — an increase of 180 per cent in five years. Even the dry years of 1974-1976 failed to dampen the rise in those values.

Experts offer tips for an uncertain spring

Bugs, pests, diseases and vast doses of indecision await Midwestern farmers if severe moisture shortages continue to be a reality into 1977.

Of course, heavy spring rains would neutralize many of the worries and bring on another set of problems — which most farmers would welcome.

Producers, however, can take some management steps to reduce drought stress on crops, animals and themselves.

Every farmer will have to make up his own mind on what steps to take, of course, but here's what some of the experts have to say.

"I would emphasize that overreaction to any possible moisture shortage situation will radically limit a producer's options," said Garron O. Benson, associate professor of agronomy at Iowa State University (ISU).

"I suspect the initial question for a

farmer would be what crop to grow next. Producers in western Iowa may want to consider grain sorghum instead of corn. In the northern part of the state conditions are more favorable for spring wheat and corn.

"And producers will want to consider that soybeans tend to handle moisture-shortage stress better."

"It wouldn't hurt Iowa to be growing a few more of the small grains anyway," Benson said.

He added that corn producers should consider planting the moderate or lower end of the recommended rate of seed population.

Similar advice is being given in other moisture-short states. In South Dakota, crops such as rye, barley and flax are being considered as a replacement for corn. Grain sorghum has been mentioned in Missouri, and wheat in Minnesota.

Benson and other Midwest crop spe-

cialists emphasized that this does not mean reducing plant population rates radically at planting. Data do not support the theory that yields will be greater than at near-normal population, they say. "Use a variety of selections when determining seed. Don't put all your eggs in one basket. We suggest that planting be completed by May 10, if possible, and then spread out the maturity date of your hybrids. In this way you spread out the risk," he said.

Benson noted that overfertilization of nitrogen could "burn" corn under stress conditions. He recommended applying about 85 per cent of the regular rate, if the regular rate is reasonable.

"I should caution that application of nitrogen this past fall was not great. This means there's going to be a lot of nitrogen going on at the same time this spring. With the Mississippi River being blocked now (by ice), supplies of nitrogen are likely to be low," he said.

Plant disease problems are expected to be fewer if the season is drier than normal, but there could be problems from corn borers. Benson said there appears to be a "good supply" of corn borer eggs. He also said weed control practices are important in dry years, since weeds rob available moisture from the crops.

In the area of livestock, Daryl R. Strohbehn, research associate for veterinary medicine research at ISU, commented, "Overpopulations of animals on pasture are likely to be serious problems in a dry season."

"Producers will be needing more pasture or they should be considering depopulating their herds."

"Creep feeding and early weaning reduces the stress on the cow and calf drastically. Producers will also find that heifers will not breed as easily in dry weather conditions," he said.

In the extremely critical areas of

South Dakota, ranchers are showing an increased interest in sheep instead of cattle, a factor that must cause western ranchers of yesteryear to roll over in their graves. Sheep, in fact, have been profitable throughout the drought, showing steady profits for the past 10 years.

"Producers will probably want to consider a supplemental feed supply. If they have to harvest the corn as silage, producers should cut the corn plant higher, leaving from 8 to 12 inches of stubble. This is because when the ear does not develop, high levels of nitrates are found in the stalk," Strohbehn said.

He said producers with extra stover stacks (corn field residue) should take steps to prevent them from being damaged by the weather and use them as roughage, rather than burning the stacks not used.

Strohbehn noted that last summer was one of the worst in several years for face flies and incidents of pinkeye in cattle.

Jerald R. DeWitt, ISU associate professor of entomology said, "This (flies and related disease) may become the No. 1 problem for the cattle producer in case of a dry year because it's the hardest to control."

"Cattlemen should plan ahead and treat the problem before it really builds up. The flies are in the pastures from April through October. Producers should start preparing for the problem in May."

"There's no one sure-fire program that's going to work 100 per cent. However, dust bags for fly control should be hung in May, at the right height and in the correct places for the cattle to rub against them," he said.

"There are feed additives available that modify manure so flies won't breed in it. However, these additives are tricky to use and you must make sure every animal gets to eat the right amount," DeWitt said.

His salvation: hogs

MILFORD, IA. — H. Robert (Bud) Zimmer has lost three crops the last three years because of dry conditions on his northwest Iowa farm. The only enterprise keeping Zimmer going is his hog operation.

"Hogs have been the backbone of our farming business," Zimmer said. "They've been keeping things together for us."

Zimmer, 43, is a veteran farmer. Never before in his 28 years farming has he encountered three dry, costly years in a row.

The crop failures also have affected Zimmer's cattle operation at a time when beef prices are low. While he used to feed out 1,000 to 1,200 beef cattle for slaughter, Zimmer now has about half that number in his feedlot.

His corn crop yielded an average of

less than two bushels per acre after a double-whammy caused by drought and early, killing frosts in 1974.

In 1975 and 1976, Zimmer got a lesson in agronomy and the variances in corn hybrids.

"I got anywhere from zero to 80 bushels an acre," Zimmer said of the past two growing seasons.

He found that the brand of corn didn't matter as much as its maturity range.

"There would be a difference of three days in the time the corn pollinated, and that would make the difference in yield from 20 to 30 bushels (per acre)," he said.

How does a farmer compensate for costly hot and dry weather? Zimmer could only say: "Better days will come."

One sells out, one irrigates, both discouraged

UNDERWOOD, MINN. — It's been so dry in Minnesota's dairyland that some ways say the cows are giving powdered milk.

You might think that's funny, but don't expect Delmar Names or Jay Olson to laugh. They're dairy farmers, or they were.

Olson was so bad off he sold his herd. And Names? He looks up from a set of stainless-steel milkers and says that without that huge irrigation system in his cornfield, he wouldn't be milking now, either.

The irrigation system cost Names \$80,000, including the 140-foot well and the electricity to run it.

Names was one of the lucky ones in the dairying region of Ottertail County in west-central Minnesota. He'd been in business long enough to afford the irrigation machinery to deliver water.

Olson wasn't as lucky. A Vietnam War veteran, he had tried to make a living off the land near Underwood for the past two years. Both years had been failures.

The first year Olson lost about \$11,000. Last year it was more, Olson thinks, but he hasn't calculated it out yet.

Olson wasn't alone. "I bet we lost at least 20 good producers," said Les

Miller, manager of the Perham Co-op Creamery in Perham, Minn. "No feed. They can't afford to buy it. And another dry year would eliminate a whole lot more."

The creamery's books show production is down about 30,000 pounds a day, or more than 10 per cent, from a year ago.

Many farmers have culled their herds. For some reason many animals were shipped to Pennsylvania, Miller says.

But no amount of culling was going to save Olson, his bankers decided. They told him to auction his Holsteins. His farm, too, if he could find a buyer. So far, Olson says, he can't. "Nobody's got any money."

Olson, 29, took up dairying after finding labor in a Minnesota Mining & Mfg. Co. magnetic tape factory "drove me up the wall. I wanted to work for myself."

So he built up a herd. Some animals cost him \$350, others \$600. At the auction this month his 27 cows sold for an average of \$350, he says. "I just couldn't feed them no more."

Without water — it didn't rain in the region after mid-July — his crops were disappointing. Olson's corn came in at about 11 bushels an acre. Oats went 22.

The land has been so dry that now, in the subzero of winter, Olson can stick a



Jay Olson, his barn empty of dairy cattle, has turned to upholstering furniture to feed his family.

spade into the soil as if it were sand. No moisture meant no frost.

He paid \$340 an acre when he bought the farm. Now Olson is asking \$400 an acre.

While he waits for a buyer, he tries

to build up his upholstering business in a small shop near his house. He continues to go to vocational-agriculture classes, because as long as he does and farms the government will pay him \$330 a month as part of his veterans' benefits, Olson says.

Meanwhile, Delmar Names worries about his cows eating more in hay than he can extract from them in butterfat. Right now hay costs him \$70 a ton, and he goes through a ton a day. Other area farmers say they're paying nearly

double that for hay, some of which is coming in from Idaho.

Besides the hay, Names has the payments on the 1,643-foot irrigation system. He installed it last July to sprinkle 200 acres of corn.

The 10,000 lakes are shrinking

Minnesota, the land of sky blue waters, is wishing for a little less blue sky and a lot more water.

The state, which prides itself on its aquatic treasury (its license plates boast of 10,000 lakes, although actually there are twice that many) is running out of its most proclaimed asset. While there is no immediate worry the state will dry up, state officials are waiting anxiously to see how much snow and rain fall in the next two months.

Their concern is well-founded. Last year:

- The city water supply of Minneapolis was tainted with an algae that added a lagoonlike stench to tapwater and, for a few days in August, caused a run on bottled water. The low Mississippi was blamed.

- More than 3,000 wells went dry in one northern county alone — St. Louis, home of Duluth. Thousands of rural residents were forced to haul in drinking water.

- Many towns on the prairie banned lawn sprinkling. Granite Falls bought seven miles of army surplus irrigation pipe with the idea of tapping a farm well outside of town. Residents there may face a bond issue to pay for that project.

- St. Paul and other cities appropriated emergency funds to drill wells this year. Minneapolis is thinking about sinking holes in some city parks.

- Some farm folks rented hotel rooms in town to take showers and baths when their wells dried up.

- State health officials daily monitor

the low Mississippi for higher pollutant readings.

- One wildlife reservoir, Lac Qui Parle Lake in western Minnesota, evaporated so much that by late fall it was a mile shorter than in the spring.

Minnesota's supply of lake and river water has been dropping for three years, and officials aren't sure that the drain will be plugged this year.

The state's largest body of fresh water, the Mississippi, is flowing at an uncomfortably low rate this winter. Last month it was clocked at 1,100 cubic feet per second — about one-third of normal winter flow. There are no major problems yet because the current still is swift enough to prevent ice from going deeper (but see story about the Mississippi on Page 8).

But according to a spokesman for the U.S. Army Corps of Engineers, the lack of snow on the ground could pose trouble come the thaw.

A series of dams down the river creates pools deep enough for barge traffic. But if the flow drops below 400 cubic feet a second, those pools can't be maintained.

"Chances are we'll have problems early, maybe by the last week of June," said Jim Braatz of the Corps' St. Paul office. "The spring thaw will pass quickly and we'll be in trouble if we don't get rain. It'll be touch and go on maintaining navigation."

Barge traffic is a major conveyance of agricultural commodities and other bulk shipments between St. Paul and St. Louis, Mo.

Bergland to push for drought insurance

There is a good possibility of a revised federal crop insurance-drought disaster program this year, because few people — especially farmers — are satisfied with the current program.

U.S. Secretary of Agriculture Robert S. Bergland labels the disaster program simply "a disaster itself."

However, Bergland wants to do more than replace the program. He wants to see every farmer in every U.S. county given the chance to sign up for crop insurance — something not possible now.

Bergland and others were irritated last fall when the Federal Crop Insurance Corp. said it would not enroll new subscribers in southwest Minnesota for 1977 because drought prospects were so serious. Writing any new crop coverage there was thought too risky.

Don't pot topsoil

Don't be tempted to scoop up some of that wind-blown topsoil you sometimes see in drifts along fence-rows in Iowa, and use it for your house plants.

This fertile-looking soil might be contaminated with agricultural chemicals, including herbicides, that could kill your plants.

Soil conservation officials report the prospect for such wind erosion in Iowa this year is great.

Bergland, at the time a U.S. congressman, chaired a special meeting last December at Sioux Falls, S.D., where he listened to testimony from farmers and others about current drought aid programs.

He favors what he calls "an all-risk, all-crop and all-county insurance program." Bergland said this program would operate much like the Federal Deposit Insurance Corp. (FDIC) operates for banks. FDIC insures bank deposits because private insurers can't handle this task.

Private crop insurers cannot handle the kind of program Bergland wants because the risks are too devastating and weather patterns tend to be severe at times.

Bergland said he would prefer to see a system under which the U.S. taxpayer would pay for the administration of the insurance program, while the farmers — or customers — would pay the premiums involved.

"I don't think farmers want charity," Bergland said. "I am a farmer in northern Minnesota. I can insure my life, my house, my auto and get liability insurance for my farm, but I can't get crop insurance for my farm."

One criticism of the current drought disaster program is that the drought has to be severe before any payment is extended to the farmer, and then there are limitations on what portion of his planted acreage is covered.

Minnesota: the figures spell disaster

ST. PAUL, MINN. — The first thing Minnesota's new governor did on taking office last month was create a special task force on drought. You don't have to be in the state long to understand why.

It was drier last year than any other year on record. Rains didn't fall on much of Minnesota after mid-June. Some areas are more than a foot short of their normal rainfall.

The result has been staggering. There are dozens of numbers you can look at in calculating the scope of a drought, but they all add up to a disaster:

- Estimates of crop losses approached \$1.5 billion. That's roughly a loss of \$12,820 for each farm in the state.

- Forest fires ravaged thousands of acres, where campers and hunters once walked.

- For most of October half the state was off-limits to most outdoor activities. You couldn't even fish in the middle of a lake.

- Rivers and lakes across the water-rich state dropped, some several feet. As the lakes evaporated, miles of new shoreline appeared.

- The Mississippi River came perilously close to being too shallow for navigation.

- Dozens of cities, including Minneapolis and St. Paul, worried about their drinking water supplies. For a time that of Minneapolis was tainted. St. Paul appropriated \$100,000 for emergency wells.

- Sales of hunting and fishing licenses were down about \$2 million from the year before.

- Canadian geese, headed south for the winter, veered from their standard flight path because some lakes along the flyway were too dry.

The severe shortage of rainfall was exacerbated this winter by an unusually light snowfall so far.

"From July through November we didn't get any growing-season moisture, and during the fall recharge period we didn't get any for the next growing season," says Earl Kuehnast,

state climatologist. "Nothing has been added to our arid area."

What about this year's prospects? "Your guess is good as mine," Kuehnast said. "We're in debt right now, and we've got to pay it back. We've got to make it up some way and the odds of that happening this spring are low."

He says Minnesota normally would have had four to five inches of fall moisture in the ground. Last year there was none. "I know of no location in the state that isn't short," the climatologist said.

Southwest Minnesota was hardest hit. Some farmers there say they can dig down 10 feet and not find any moisture.

Farming took the brunt of the drought. Wherever you go they tell horror stories. "My average corn yield should be close to 100 bushels an acre, but last year it was about 30 bushels," said John Tiffany. He farms near Redwood Falls.

"Crops? We had hardly any," reports a grain broker in Montevideo. "It didn't pay the gas in the tractor to go out and cut them" some places nearby, she said. Her office traded just half the bushels of grain last December that it had a year before.

Statewide the crop casualties were enormous:

- The corn crop was one-third down from the yield of pre-drought 1973.

- Oats ran about half what they should.

- Soybeans were down nearly 30 per cent.

- Hay became spun gold. While no loss figures are available, its soaring prices are. In 1973, for example, hay cost about \$28 a ton in Minnesota. In 1974, the first year of drought, it went up to \$45. Last year the average price was around \$70. And today some farmers are quoting prices near \$125.

- Pasture was "wiped out statewide virtually the entire season," according to a spokesman for the state's agriculture department.

- A fifth of Minnesota's counties each lost more than \$30 million in

potential harvests. One, Redwood, lost twice that much.

- Most counties applied for disaster relief.

- Loan applications for Farmers Home Administration (FmHA) credit have flooded offices in the driest counties. So far about 2,700 farmers have applied. The deluge forced the federal loan agency to hire 24 more employees statewide, and Les Matts, chief of the FmHA program in Minnesota, expects applicant lines to grow longer by spring. He talks about a potential total loan request of \$100 million.

- Temporary work for destitute farmers was instituted with about \$2 million in federal funds. For every one of the 900 or so jobs, there are several applicants. To qualify a farm family's income must be under \$4,700 a year. The work, which pays \$3.50 an hour and can last 12 weeks, ranges from cleaning drainage ditches to courthouse clerical tasks.

- Dozens of drought-stricken farmers have asked if they qualify for food stamps, and were told they do.

- Many growers stretched out their debt. Short-term loans became long-term. "There's a lotta scrambling going on, reworking financial statements," said one banker in Montevideo. "Our loan demand is up, and there's not much deposit growth, so it puts a bind on things. It'll take time to work it through."

- As yet there are no reports of foreclosures on farms or businesses. "But we'll see some if this year's as dry as last," the Montevideo banker predicted.

- Spending by rural residents plummeted. Some small-town retailers say business is down a third. "Everyone's low," said a service station operator in Granite Falls. "You don't have the bucks, you don't spend 'em."

- Farm machinery and implement sales went flat. Some dealers reported an 80 per cent drop. Moe Equipment Co. in Appleton, Minn., laid off a set-up crew of four and sent its combine

salesmen off to Iowa and other states looking for business.

- Fertilizer isn't moving either. "We didn't sell a pound last fall. Normal we sell 100 tons or so," said Maynard Estwick, manager of a lumberyard in Milan, Minn., which handles farm supplies. Milan has the dubious distinction of being the driest town in the state.

Average corn yield for the state in 1976 was 59 bushels per acre, according to Richard Stolz, an economist at the Ninth District Federal Reserve Bank in Minneapolis. He said the average yield in 1975 was 70 bushels, in 1974 it was 61 bushels and in 1973, the year before the drought began, it was 93 bushels.

Meanwhile, the total number of acres planted to corn fell from 5.9 million in 1974 to 5.6 million in 1976.

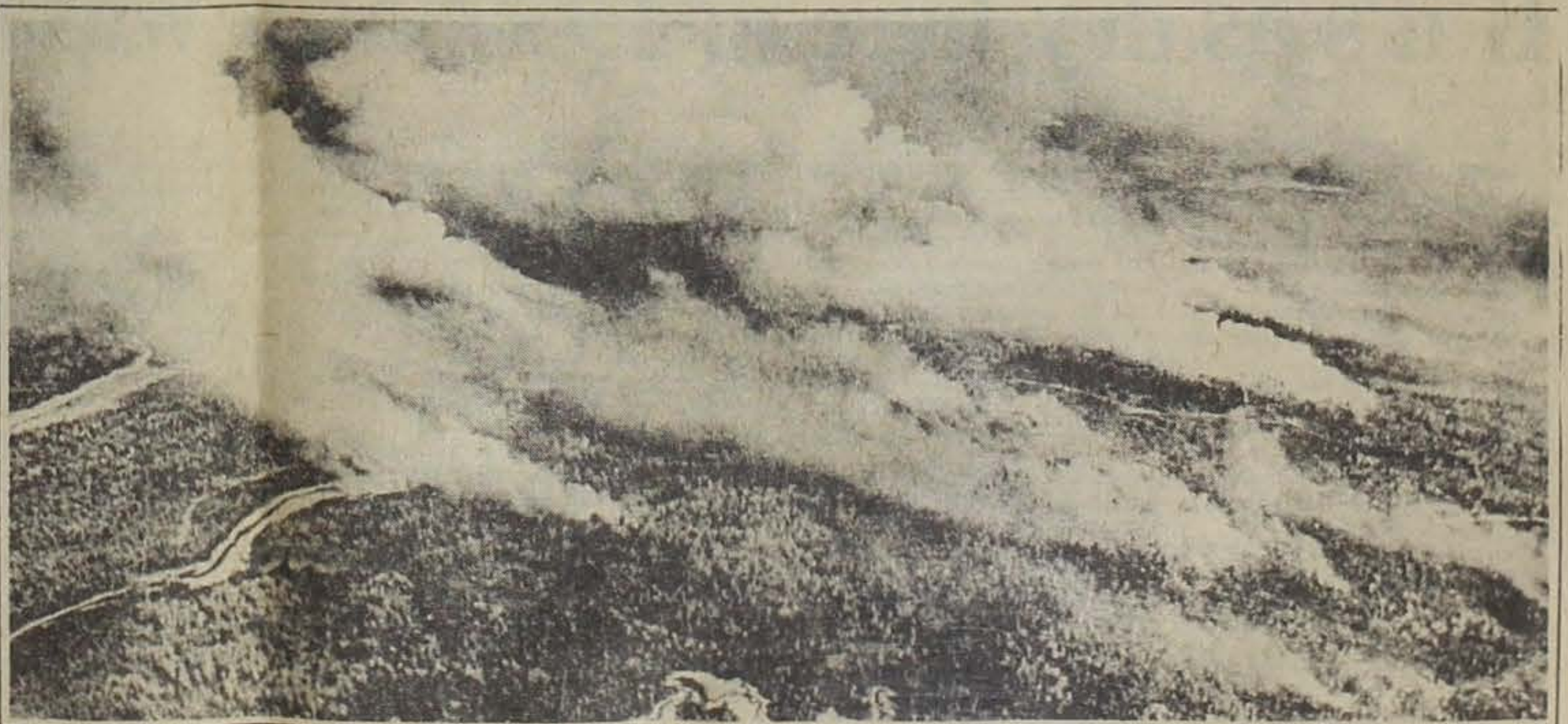
Stolz said many farmers in 1976 switched to wheat. Acreage in wheat rose to 4 million in 1976 compared to 2.8 million in 1975 and 2.7 million in 1974. Yields in 1976 were good, he said. The average yield was 32.2 bushels in 1976 compared to 30.8 in 1975 and 28.9 in 1974. In 1973, however, the average wheat yield was 38.9 bushels per acre.

Some farmers are considering going in on rainmaking pools. "The rainmaker boys are shaking the bush for donations around here again," says Estwick, the Milan lumberman. But after last year's poor results from such an effort, he says farmers are dubious about trying again.

Without rain, Minnesota's woods became a tinderbox. Forests exploded last fall. So many fires were raging by late September that the state banned most outdoor activities in the northern half. That included smoking outdoors.

The ban came just as thousands of hunters were ready to invade fields and bush, and resort owners, swamped with canceled reservations, howled for some respite. They got none.

All told, fires ate up 138,000 acres. Scores of firefighters — each costing the state about \$100 a day — were flown in from as far away as Florida.



Dry Minnesota forests gave fire a free hand. This blaze cut through Boundary Waters Canoe area at Lake Saganaga.

One small town in the middle of a drought

HIGHMORE, S.D. — Here, but for the grace of God and rain, is the story of your little town.

Highmore is a pretty place, pop. 1,000, the only town in a county of 2,000. Up and down Iowa Ave. — the wide, main drag — things don't look so grim.

The bars are still full at night, people still smile — and money? Well, Duke Lawrence, 71, the barber, says: "I don't have any trouble finding someone to shoot craps with."

But things are not right.

You expect to find life pretty well charted in the Highmores of the Midwest, but here uncertainty looms. Says rancher Merle Ankrum, who is also a county commissioner: "People don't know what to do. I've never seen such indecision, and things keep getting worse."

School superintendent Leo Uken says activity ticket sales are down, requests for free hot lunches are up and attendance at Highmore Pirate basketball games is way off.

The local dentist, usually booked three months in advance, is now down to two weeks. "That's how bad it is," says county extension agent Bill Paynter. "People are just letting their teeth go."

Why?

Normal rainfall in this area is 18.79 inches a year. In 1974 and 1975, they didn't receive two-thirds of what they should have. During 1976, only 9.28 inches fell, and only 4.92 inches of that came during the April-to-September growing season.

"Look at the sizes of those growing season rains," says Paynter, fumbling through statistics he's wearing out. "The best one we had in the season was 65-hundredths, and you lose 25-hundredths of any rain to evaporation."

It's been so dry, he says, that "there isn't a natural lake or pond in Hyde County with any water in it."

It's been so dry, says banker Lee Straight, that "right here in the middle of the county, we didn't even have any thistle grow. Twenty miles north, that's about all that did grow, and the boys cut it for feed."

Farmers and ranchers here had a 97 per cent crop loss in 1976, which translates into a financial loss of \$16.2 million — or \$8,100 for every person in the county.

But crops are only a small piece of the agricultural picture. Livestock is the big item, or was, in a local economy that has virtually no industrial jobs.

When the pastures died last June, most cattle producers began selling part, and eventually most, of their herds.

Two years ago, there were more than 100,000 head of cattle in Hyde County. The "mini-droughts" in 1974 and '75, coupled with sagging markets, cut the number to 75,000 head in January, 1976. Now, one disastrous year later, it is estimated there are fewer than 12,000 left.

The outlook is not good.

There has been almost no snow this winter, leaving loose, unfrozen soil to the wind. "By working the ground very carefully last fall, we were able to leave it furrowed enough to hold down on wind erosion," says Ankrum.

But after the prolonged dryness, it's now easy to walk into a field and kick

down 10 inches into the soil. That condition, he says, "scars us to death when we think about the winds of February and March."

There is no winter wheat crop coming in the area and, unless there is above normal rain this spring, pastures won't green and there will be no chance for summer crops.

If there are no pastures or crops, there will be no cattle. Highmore and Hyde County can't survive many more years of such herd depletion.

There's no state income tax in South Dakota. The money that government runs on is the property tax.

"Hyde County is more tax dependent on agriculture than any county in the state," says Paynter. "Unfortunately, agriculture here doesn't have much to offer right now."

County officials have already stripped their budget of "frills" — they cite a road building program and mileage for employees — in anticipation of what's coming. The school, which derives over 70 per cent of its income from the county, will lose more than \$150,000 in the next 18 months because of the depleted tax base, officials estimate.

"It means cutting staff, maybe four or five from our faculty of 46," says superintendent Uken. "And it means cutting programs, and I'm not talking about just seventh-grade basketball. I'm talking whole departments."

And yet, the local economy remained fairly strong into late January.

There have been no farm foreclosures. When property taxes came due Nov. 1, there were no more delinquencies than normal.

A few businesses reported drops — the implement dealer says new machinery sales are off 90 per cent and the hardware man is down about 35 per cent — but most say they felt no change in spending habits through Christmas.

Why?

"If you've got kids," says Paynter, "you're going to scrape something together for presents. But I think it was the last big fling. People are starting to pull in their horns now."

"What happened here is that when these guys liquidated their herds, it put money in their pockets. They've been able to meet their loan payments, pay their taxes and live about the way they're used to."

"But to put it in perspective, let's say you own a grocery store. If you just keep selling but don't restock the shelves, pretty soon you're out of business," he says.

"That's what's happening in our cattle business right now. No one's restocking. And when it comes time to, is the money going to be there?"

Banker Straight says his institution's agricultural loan portfolio "has been stretched, but we're still OK." He says there has been widespread refinancing of farmland. "The Farmers Home Administration has done pretty well by us up to now," he says, "but I'm afraid we're going to be asking them to do a lot more."

"Before this is over here, I'm sure we're going to see 95 per cent of our farm operators needing some sort of disaster loan."

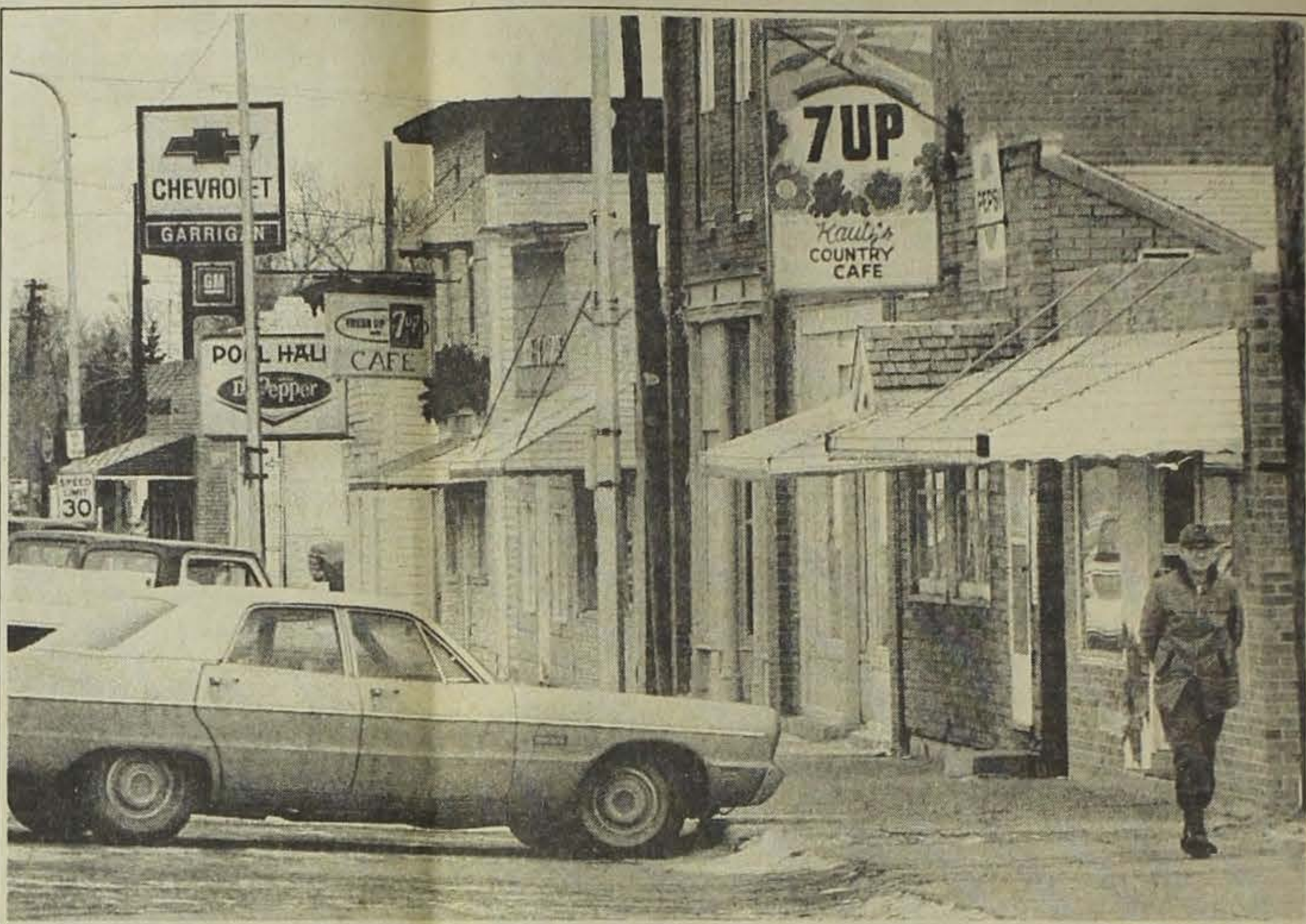
Unemployment in the county is officially listed at just over seven per cent. "That doesn't include farmers and ranchers who have sold their herds and are effectively unemployed," says Ankrum. "Add them in and you're up to 20 or 25 per cent."

An emergency public works project has put 21 such farmers to work for the county, a few others for the town.

But most are simply sitting, biding time. Says Ankrum, who has lost \$100,000 in three years and wants no more gambles: "Time is the one thing we've got plenty of."

And yet, time is running out.

Right: Rancher Merle Ankrum walks through a corn field planted last spring. The crop grew six inches high, then withered and died.



Above: Shoppers are sparse on Iowa Avenue, the main street running through Highmore.



Far left: Highmore barber Duke Lawrence says there's still plenty of money for crap games, and now ranchers have the time to play. Left: County extension agent Bill Paynter admits, "There isn't a natural lake or pond in Hyde County with any water in it."



Double dose

MONTEVIDEO, MINN. — It was a bad year for Bruce Tanhoff.

First, he and his partner, who do bridge and other construction work for towns around Montevideo, lost a half dozen projects because the municipalities found their revenues were short. The towns blamed the drought and the lack of crops.

Then came winter, when Tanhoff runs the Granite Valley Fur Co. It buys pelts of mink, muskrat and raccoon from trappers and sells them to fur brokers. But it was so dry that the animals left for deeper streams.

If it's as dry here in 1977 as it was in 1976...

PIERRE, S.D. — "Every time you flush the stool, you shoot five gallons of water."

Dewey Larson, the mayor of Wood, S.D., 60 miles south of here, was talking drought and how to live in it.

"So, you don't flush it as often as you should. You just can't waste the water."

His sidekick, Jim Burnham, who drives a gasoline tank truck, nodded and said, "Yeah, water's worth more than the gas I haul."

South Dakota is sick with drought, and all indications are that it's going to get sicker — even if it rains.

"We're not crying wolf," says Larry Venner, Assistant Secretary of Agriculture. "We don't want to accelerate panic; that serves no purpose. But, yes, we've got serious problems."

In the eastern half of the state, where conditions are most severe, they say it's worse than the '30s, that it's more comparable to 1910. In many areas 1976 precipitation was the lowest

on record, and the records date to the turn of the century.

The winter has produced little snow. "What we've had we call snirt," says state trooper George Samis. "That's blowing snow that's mostly dirt."

No one knows whether the spring will bring average rain. But what about the above average rain the state really needs? That's a 1-in-15 shot, says state climatologist William Lytle.

What if it's as dry in 1977 as it was in 1976?

Robert Duxbury, state Secretary of Agriculture: "It would put us out of business."

The impact is already disastrous: • Crop output in the state in 1976 was 67 per cent below the 1967-to-1974 average. In 19 of the state's 67 counties, the crop loss exceeded 90 per cent.

• Lack of feed has forced the "sell down" of 42 per cent of the cattle that were in the state a year ago. In seven counties, the sell-down figure is over 75

per cent. Cattle producers are quick to point out that bad markets prevented any profit the previous two years. "If cutting numbers is what's needed to turn these damned markets around," says Jack McCulloch of the Stockgrowers Association, "then South Dakota has done its part."

• Most pastures are so severely damaged that officials estimate a five-year recovery. Many will need complete restoration, they say.

• Over 30 communities report severe water supply problems. Without good rain this spring, many will totally deplete supplies by mid-summer. In some towns, you do not ask for water in restaurants.

• Wells have failed everywhere. "Used to be you could hit water at 14 feet," says Wood's Mayor Larson. "Now you go to 70 feet and still can't find much."

That's prompted widespread water hauling, and it's not unusual to pay \$30 for 1,000 gallons. An average family,

with normal usage, can run through 1,000 gallons in a matter of days. Says Wood grocer Warren Sinkler: "If you've got three or four kids, they find out they can all use the same tub water."

• Farm foreclosures have been averted thus far with emergency loans, but state officials predict there will be many if spring crops can't be planted. Young farmers and ranchers will be hardest hit.

The total financial impact of drought in 1976 is \$1.5 billion, according to the state's Drought Assistance Office. They say that figure is "conservative."

Early on, President Ford issued an "emergency declaration" covering 62 counties. "That program provided money to maintain production," says Duxbury. "What we need now are programs to maintain life and property."

But when state officials sought to have South Dakota declared a "major disaster area" — which would make

even more funds available — the request was kicked around until early January and then denied.

There's bitter conjecture here that the pleas for help were lost in the shuffle of Presidential transition.

Most are hoping President Carter, a farmer, will listen to new Agriculture Secretary Robert Bergland, from neighboring Minnesota, and to South Dakota's two Democratic senators — and then respond favorably.

"The devastating conditions... have tested the very fiber of those in the grips of the drought," Governor Richard Kneip told legislators in his state of the state message in late January.

"I pray that God will hopefully intervene and bless all parts of this state with adequate rainfall. This prayer should be in the hearts and minds of all people."

The most seriously affected area is from Pierre to the northeast corner of the state.

Average annual rainfall in that area runs from 18 to over 20 inches a year. In 1976, the average received in that area was just over nine inches. One town, Milbank, received 7.67 inches against a norm of 22.12.

What did it mean?

• Jerry Bown, 41, Onida: "I work with a neighbor, and in 1975 we put up 300 stacks of alfalfa off our fields. In 1976, on the same fields, we put up three."

• Don Eichacher, 41, Salem: "I had 500 acres of corn ground that normally would yield 65 to 70 bushels per acre. I got three-bushel corn on it."

• Agriculture Secretary Duxbury, whose sons are the sixth generation on a ranch near Wessington: "We've got 500 acres of hay that would normally give us 750 to 1,000 tons. In '76, we got 36 tons."

Not all of South Dakota was that

SOUTH DAKOTA

Please turn to Page 5-H

SOUTH DAKOTA:

Renter going broke/ Credit runs out/ Irrigation expands
Living on hope/ Squabbles over water/ 8 years to recover

THE
THIRSTY
LAND

Slowly, painfully going broke

BLUNT, S.D. — Like the land he works, David Hauschild is worn out. His face is the face of drought.

Hauschild, 28, owns no land, but leases 2,400 acres here in central South Dakota.

To maintain those leases and make any money, he needs a good crop — wheat, oats, alfalfa, some hay — year after year, plus a good market for his cow-calf operation.

But he hasn't had a good crop in three years, and in 1976 he had no crop at all. Few "cow dollars," as he calls them, either.

So he took a loss he guesses will run \$50,000 to \$75,000. That will push his total indebtedness to over \$90,000. Now, he needs to borrow \$50,000 more if he's to operate this spring.

He can't get it.

David, his father Leslie, 53, and brother Burt, 26, have separate farm operations, but they share their labor and machinery.

In the way that woe seems to beget more woe, Burt has now been effectively removed from the operation while he fights cancer, and Leslie can no longer do heavy work because of spinal arthritis.

So the load falls to David, who chores after driving home from a full-time construction job, which he was forced to take, and on which he recently smashed a finger.

"I don't know what we'd do for household money if David didn't have that job," says Cheri Hauschild, 26, who stays at home with Jennifer, 2, and Caleb, 4 months.

But the worst is yet to come, David and Cheri agree.

Mar. 1 will see him in bankruptcy, he says. The 100 cows he still has will go. The farm machinery will go. And David Hauschild will go, too.

"Somebody who's born and raised on the farm and still wants to farm, well, it's pretty tough to leave," he says. "I s'pose I'll stay on with construction and try to start building all over again."

When the farm machinery goes, Burt Hauschild's farming operation will go, too, says David. "And with both of us having to go out and get non-farm jobs, Dad will have to get out," he says. "It's not a good time for us."

No one is telling Hauschild his problem is poor farm management — and his situation has been studied closely by his banker, implement dealer, Farmers Home Administration (FmHA) loan officers and officials of the South Dakota Department of Agriculture.

The problem is simpler: In the Blunt area, where the average annual rainfall is 18.79 inches, just 7.39 inches fell in 1976. The situation was only a little better the previous three years.

Conditions like that are especially tough on young farmers, like Hauschild.

"If I owned land, I wouldn't be in this trouble because I could refinance it and have operating money," he says. "But I can't buy land yet. I haven't been in farming long enough to have the capital."

"So I have to borrow and lease. My crop is the security I borrow against, and when I don't have a crop, I don't have any security. I guess there's only so far the bank and FmHA can go on loans, or so they say."

"Times like this, you can't afford to decrease the size of your operation because then you have to make twice as much to get by. The only way out of the hole is to expand, and expanding just makes the hole bigger."

"I'm just like a gopher in a sandpile."

What would help? "\$50,000," says David. "Some terrific legislation," says Cheri.

She shares the frustration of most South Dakotans, who were stunned

After driving home from construction job in Pierre, Dave starts his chores as twilight covers the 2,400-acre ranch he leases.



David Hauschild and family: "I'm just like a gopher in a sand pile."

when the state's bid to be declared a major disaster area — and thereby be eligible for millions of dollars in federal assistance — was rejected in the late days of the Ford Administration.

What now for the Hauschilds?

"It's impossible to have any ambition," she says, "but we try to have a little hope."

Outside, the winter wind whipped at soil covered only by cow chips. The bark continued to peel off the trees in the shelter belt.

Tale of the hungry cows

Some old-fashioned horse-trading may have gone on between several Iowa farmers and South Dakota ranchers, according to sources in the banking industry.

South Dakota ranchers are worried their cow herds of excellent seed stock will be depleted because of the lack of feed in their areas due to the drought.

To cushion the depletion, some ranchers offered Iowa farmers a deal, which on the surface appeared to be all in favor of the Iowa farmers.

The deal was this: The Iowa farmer would take the ranchers' bred cows — usually in lots of 100 head at a time — and feed them on corn refuse over the winter. Then this spring, the Iowa

farmer would return 75 cows, with their offspring, to the rancher, leaving the farmer with 25 cows and offspring for payment.

"The rub is that the bred cows were undernourished because of the earlier lack of feed," an Iowa banker said. "With the onslaught of extremely cold and continuous subzero weather, these cows began dying like flies. Now the farmers are finding it tough to come up with 75 head just to return to the South Dakota rancher."

"These Iowa farmers thought they had a good deal, but they're going to end up with money out of the pocket and the ranchers are coming out on the good end of the stick," he said.



... 'It would put us out of business'

SOUTH DAKOTA
Continued from Page 4-H

desperate. In the western tier of counties, rainfall was above average. But now, drought is a factor even there: The western winter wheat crop is said to be "sick."

Projections are that the economy of South Dakota is going to be eight years or more recovering.

The saddest thing, says rancher David Hauschild of Blunt, "is that the effects haven't even started to show." State officials agree with him.

"All the spending figures are up," Hauschild says. "New car sales, appliances. And people are going on long trips. But it's a false picture."

"Ranchers and farmers sold off their cattle and they have a little money. So they started buying while they had it. They take the trips because this is a once in a lifetime opportunity. Every other year, these guys have had cattle they had to stay home to feed."

The cattle sell down is a matter of particular fright to state officials.

"We're very concerned about holding our good bloodlines," says Venner. "If a guy's got 200 head, I want to see him hold at least 40 of his best. That way, when things recover, we don't have to take the culls from other states. But the guy's going to need help to keep even those 40."

The kind of help Venner is talking about is money.

To this point, many farmers and ranchers have been refinancing their land for operating capital and living money. "All we're living on is the equity that's in rising land values," says Pukwana rancher Bob Healy. "But most of us are backed so far into our land that we can't get any more from it."

There's been a rush on Farmers Home Administration (FmHA) money, with even more of a rush predicted.

FmHA official Maurice McLinn says the agency is expecting to make 4,000 production emergency loans in the state in the coming year.

"What we're talking about there is \$125 million over and above the \$100 million in regular loans we're making year after year," he says.

Besides the money scramble, the drought has also produced a run on irrigation equipment.

Al Griffiths, director of conservation in the agriculture department, says in 1974 the state granted 14 permits for extraction of ground water. In 1976, there were 1,000 such permits.

"Irrigation is a new and expanding art here," he says. "We're still badly in need of more technical knowledge about it."

"We're optimistic about it and we encourage it where possible, but we emphasize it's no cure-all. For one thing, it's a large investment, especially when you're talking about irrigating dry land worth no more than \$300 per acre. It's a different story when you're talking about that \$1,800 per acre Iowa land."

The drought has also brought calls for the rapid completion of the Oahe Irrigation Project, a long-range program that will take water from the Oahe Reservoir at Pierre and spread it east through canals.

State officials acknowledge that with the irrigation boom, they are wary of water fights.

A year ago the James River — located in east-central South Dakota and fondly called "the Jim" — was sapped by the demands of adjacent crop farms and the towns along the river.

"The state finally shut some irrigators off, and then put up spotter planes to make sure there was compliance," says Mike McNamara, chief of the Drought Assistance Office.

In an attempt to head off such squabbles, the state legislature is expected to renew efforts to delineate water rights.

That's one of about a dozen water-related matters the Pierre newspaper

recently said might end up "drowning the legislature."

And the drought has put other matters before that body, too. Taxes, for example.

South Dakota has no state income tax; state government operates on sales and gas taxes. Some officials fear that decreased spending and less use of autos and farm machinery might cut heavily into state revenues and are lobbying for an income tax.

Officials of cities, counties and schools — all of which operate on a property tax that is heavily dependent upon agriculture — say some change in tax structure is necessary to overcome the losses they are sustaining with the crop failure and cattle depletion.

But state agriculture officials worry most about what drought could do to the face of farming in South Dakota.

McNamara says only two per cent of the state's farmers are under 25 years old, while 35 per cent are over 55.

"You worry that the young guys who

are renting and depending on good crops may not be able to stay with farming," he says.

"And you worry that the older guys who went through the '30s seeing the handwriting on the wall and figuring this might be a good time to move to town. Who's got the money to come in behind them if they want to sell or lease?"

And then there are those at mid-career — those who have too much invested to quit, but not enough equity to be able to weather several bad years. Like Don Eichacker of Salem, they're caught.

"Luckily, I had enough assets to cover me last year, and using all my capital, maybe I can make it this year," he says. "That's reason for some hope."

"The farmer has always operated on hope. You can't take the attitude that it isn't going to rain and that we're all going to go broke. If you do, you're beat already," he says.

Nebraska wells go down, down. . .

Nebraska is dry to look at, but just a few feet below the surface lies what many have considered an endless supply of water.

In 1976, a drought year with an average of only 17.12 inches of precipitation, Nebraska farmers drew on that underground sea to produce an average corn yield of 112 bushels per acre on irrigated land.

But that rosy report has an unhappy footnote:

That sea of water is beginning to dry up.

Nebraska Conservation and Survey statistics show that the water level in wells is slowly but surely drawing down.

Extensive pumping for irrigation at one point has dried up the water supply of communities, of neighboring farmers, and — combined with the drought — helped dry up streams that were formerly rich in fish and wildlife.

Lawsuits have been filed in behalf of those who lost their water supply and judgments obtained against those who sapped that supply.

At least five new proposals on water rights are on file in the Nebraska legislature, including one that would give fish and wildlife "legal rights" to water they need to survive.

Corn production is a vital to the Nebraska economy, and irrigation is the key factor in making a crop.

In the last three seasons, when Nebraska received an average of 17.81 inches per season (comparable to northwest Iowa), dry-land corn production averaged 38.8 bushels per acre.

On irrigated land, corn production the last three years averaged 103, 113 and 112 bushels. Nebraska ranks third in the nation in irrigated acres and it is estimated the economic impact of having water available amounts to more than \$2 billion a year.

Just over 50 per cent of Nebraska corn is produced on irrigated acres. Nebraska farmers planted 7 million acres of corn in 1976, harvested 6.2 million for grain with a total crop of 514.6 million bushels for a statewide average — irrigated and non-irrigated of 83 bushels.

A monumental battle is shaping up in Nebraska over water rights. The course of the battle and its outcome will be closely watched in other areas where water is important to the survival of an entire economy.

That includes Iowa where irrigation, though a long-time practice in water-rich areas along the Missouri River, is only now being developed.

Norman Stuckey of the Nebraska fish and wildlife division, a member of an interagency group that has been studying depleted stream flows, explained some of the conflicts.

"There is a misconception that minimum stream flows are essential only for fish," he said. "Nebraska is an agricultural state and the mere mention of fish and wildlife gets a lot of people turned off right away."

"Actually, fish and wildlife are 'indicator' species telling us that we, the people, are going to be hurting."

"Many will admit that Nebraska has gone too far (in surface water consumption), but how do you undo it? We must realize that fish and wildlife are trying to tell us something," he said.

That "something" came home to three Madison, Neb., families who woke up one day to find their wells dry.

The Darold Prathers, Paul Furleys and Robert Zessins reacted by going to court against their neighbors, Donald and Sharon Eisenmann, charging them with depleting the water supply.

Judge Merrit Warren ordered that the Eisenmanns be enjoined from lowering the pump in their irrigation well and pumping so that it interfered with the plaintiffs in the use of their domestic wells.

A publication called Groundwater Levels in Nebraska, published in December, 1976, tells the story of what is happening to Nebraska's underground water supplies.

With few exceptions, the level is going down, down, down.

"We know of no critical areas" at the moment, said Darryl T. Pederson of the Conservation and Survey division, author of the publication along with Michael J. Ellis, U.S. Geological Survey.

"We're looking at maybe 20 to 30 years of water left, in even the worst situations," he said.

The 1975 water survey issued last December (the 1976 report is due in June) says the average water-level between the fall of 1974 and the fall of 1975 was down in 82 of Nebraska's 93 counties, and down significantly in eight major areas.

The decline in water level really begins in 1958 with the irrigation boom that has seen 3,000 to 4,000 or more new irrigation wells sunk each year.

At the end of 1975, 49,471 irrigation wells had been registered in Nebraska, according to the study. These wells are the source of water used in irrigating about 80 per cent of the estimated 5.4 million acres of irrigated land in the state.

The amount of groundwater pumped for irrigation is estimated at about 5 million acre-feet in 1975.

This amount is several times more than the total amount of groundwater pumped for domestic, livestock, municipal, and industrial uses.

Dryland corn growers have gained enough knowledge over the years to conserve what moisture is available. This has enabled them to move from an 8.4 bushel per acre average during the 1930s when rainfall averaged 17.12 inches per year, to the 38.8 bushels last season.

Donald Hanway, retired agronomist from the University of Nebraska in Lincoln, explained how it is done.

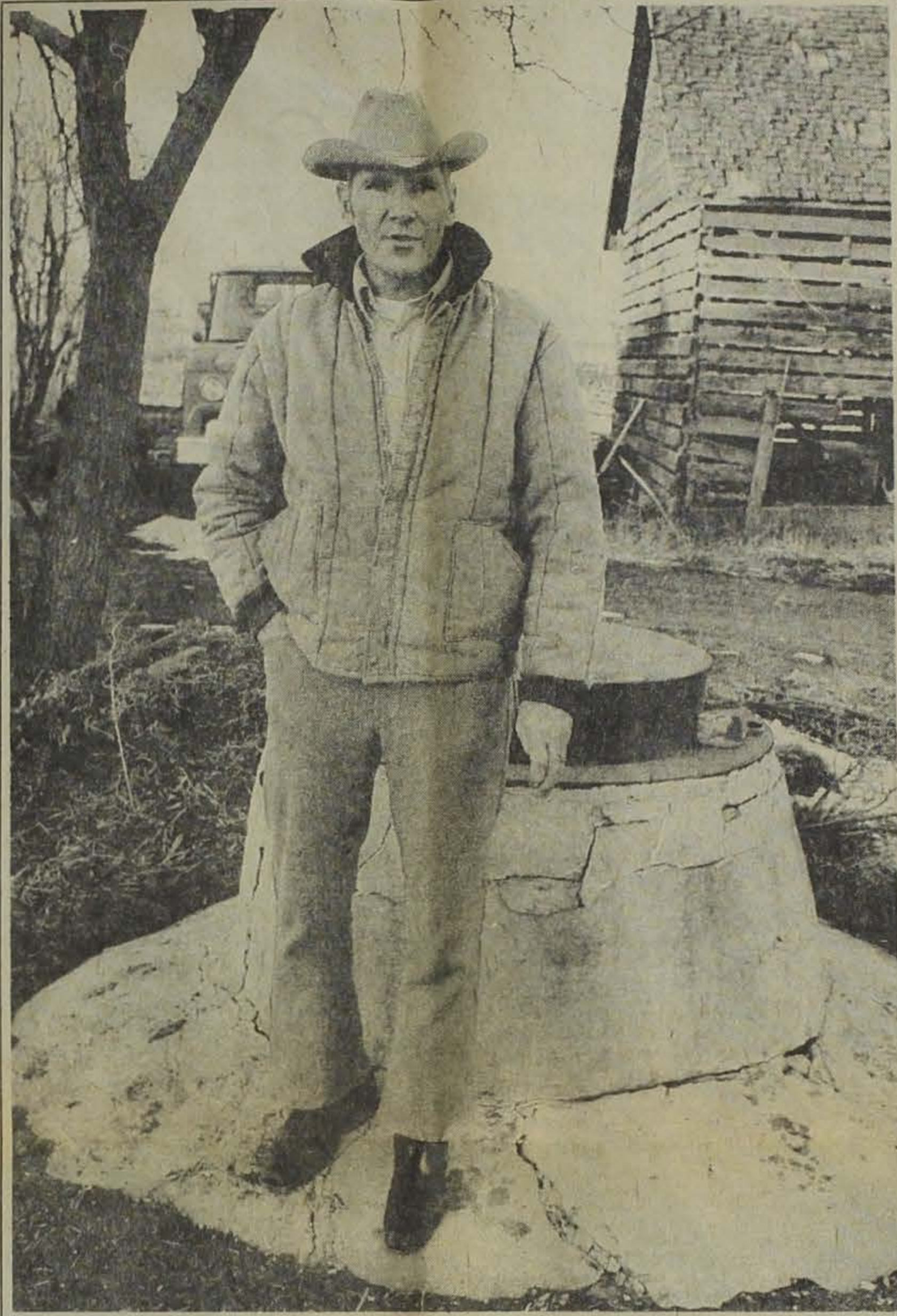
"Thanks to research and experiments by seed corn companies and universities, we now have hybrids with built-in tolerance to heat, drought and other stress factors," Hanway said.

Dry land farmers also have alternatives to corn production that were not generally available in the 1930s, such as soybeans and grain sorghum, which are both drought tolerant.

Dry land corn yields in recent years prior to the drought ranged from 60 to 80 bushels per acre, a University of Nebraska agronomist said.

Part of the reduction in yields the last three years was caused by heat as well as dryness, he said. It was so hot in 1974 that some varieties did not shed pollen, he said.

About 3 million acres in Nebraska



Paul Furley and two neighbors took their Nebraska water fight to court and won.

are planted to wheat, and yields have been little affected by the drought.

Nebraska farmland values, meanwhile, have been "going out of sight," according to extension agronomist August Dreier.

"I've heard of non-irrigated land in western Nebraska selling for \$1,000 per acre," he said. "And a lot of the irrigated land is in the \$2,000 per acre range, with some selling quite a lot higher than that."

Those figures are double those of just a few years ago, Dreier said.

Nebraska's current policy on water use, obviously, is generous.

Anybody with \$1 can go to the state and get a permit to drill a well and tap the supply.

Nebraska generally follows two doctrines in water law: Surface water is public property, and is dedicated to the use of the people of the state, subject to regulated appropriation; underground water is for use on the land, but preferential use is specified.

Domestic uses have preference over all other uses, agricultural uses have preference over manufacturing and in-

dustrial uses. Fish and wildlife have no preference.

Legislative bill (LB) 313 would add recreation as a fourth priority and fish and wildlife as a fifth priority.

Lee Rupp, a conservationist with the Nebraska Game and Parks Commission in northeast Nebraska, has been going around quietly expounding the importance of fish and wildlife as indicator species. His message is simple: What happens to them may ultimately be the fate of all life in the Cornhusker state.

'A slow death by debt'

HALLSVILLE, MO. — When C.C. Charlie Rumbaugh started farming near this mid-Missouri town more than 20 years ago, "you could buy all the farm land you wanted for \$100 an acre," he says.

Today, however, good farm land here goes for about \$800 an acre. But Rumbaugh isn't farming his land anymore. He sold most of it last year for \$750 an acre, even though he thinks the land will keep rising in value.

Why?

Rumbaugh and many others like him are the victims of a curious trend in the world of farm finance. Some call it "living on land inflation" and others call it "a slow death by debt."

As farm production costs have increased, Missouri's three-year stint of dry weather and bad markets have kept crop yields, prices and profits down.

So farmers like Rumbaugh have found themselves borrowing against the rising value of their farmland to finance a growing percentage of their crops.

"I found myself going to the land bank to pay off the PCA (Production Credit Association). Pretty soon, I got tired of it. I had a quarter to a half-million-dollar investment sitting out there, and I was earning four-tenths of one per cent return (\$10,000 to \$20,000) each year."

So Rumbaugh called it quits. He sold out, but only after he had encumbered his farm with a \$140,000 mortgage. "If we would have had some rain and I would have stayed out of the cattle business, I wouldn't have owed a penny on it," he said.

Not many farmers in the Midwest have decided to quit farming. That may be because the severity of dry weather and the value of land vary from state to state. But most farm finance officials agree that farm debt is on the rise. The U.S. Agriculture Department said it rose 12 per cent, \$101 billion, in 1976.

In some states, such as Iowa, rising land values have far outstripped the rate of increase in debt. And in many cases, an increase in farm debt is healthy. Farmers borrow money when they are doing well, and tax considerations sometimes make big loans a prudent move.

But the situation in Missouri and a few other states such as South Dakota is beginning to cause some concern.

The disturbing element is not that farmers are borrowing more money; it is the kind of loans they are getting.

Traditionally, and this is vastly oversimplified, farmers finance their operations through non-real estate loans, similar to car loans. They are repaid faster than, say, a mortgage loan on a home.

When the crop comes in, they then pay off the loan and their expenses. What is left is profit.

However, dry weather reduces crop yields. That can mean higher feed costs and reduced profits, or even losses. Farmers then fall back on their land; they give the bank a mortgage on the land in return for a long term loan to pay the bills.

Normally, such financing presents no problem. But when there are three successive bad crops, as there were in Missouri, that can spell trouble. Farmers can only borrow so much on their land, and then "their backs are up against the water trough," says Ed Harshbarger, an agricultural economist at the Tenth Federal Reserve District in Kansas City.

Harshbarger says the trend, called "debt restructuring," has occurred in Missouri more in 1974 and 1975 than it did last year. "I think creditors have done a good job of protecting themselves and keeping their clients from going in over their heads," he said. So, few persons have heard of any foreclosures.

But, Harshbarger says, "The potential for trouble is there."

The situation is not so bad in Iowa. Terry Francel, an agricultural economist at the Seventh District Federal Reserve Bank in Chicago, Ill., says the spiral in land values has outpaced the rising rate of debt. Besides, the crop yields in Iowa were not as bad as in Missouri, and the land value is generally higher.

Refinancings are up in Iowa, indicating that some farmers might be having trouble paying off loans. But Francel says he sees nothing to worry about. For one thing, the banks are in good shape, he says, and the situation could be a reflection of more co-operative lenders. Interest rates are down and more lenders are entering the farm loan market, he says.

Farmer Rumbaugh doesn't feel as confident. He says he thinks farmland values will continue to increase, but not as fast as they have in the past.

And he offered this note of caution to those who choose to sell out: "Tell them to check out the taxes."

Rumbaugh says the man buying his farm agreed to assume the \$140,000 mortgage. "But the IRS counts that in the sale price. I have to pay taxes on that, just as if I actually got it. I didn't figure on that."

"I won't get any money from the first year of his payments. It all goes to pay the real estate commission and taxes."

. . . and so do Missouri's corn yields

The U.S. Department of Agriculture says parts of Missouri are as parched as the Dust Bowl days of the 1930s, but the dry spell that has hit the state for three successive years has not caused a wave of farm foreclosures reminiscent of the Depression.

Problems are mounting, according to farmers, farm officials, agribusinessmen and educators. Crop yields are down, cash receipts are off, and farmers are sinking deeper into debt. But conditions in 1976 are less drastic and, perhaps, a bit more subtle, than the leaner days in agricultural history.

Instead of foreclosing on the bad debt of a farmer who has suffered successive crop losses, a banker might suggest he sell some land to keep going, officials at the Farmers Home Administration (FmHA) in Columbia say.

"You won't see any farm bankruptcies," adds Don Emery, executive director of the Boone County Agricultural Stabilization and Conservation Service in Columbia. "Farm people just are not like that. But I can tell you this; they have financial problems. They won't talk to you about them, but they have them all right."

At the heart of the problem in Missouri is lower crop yields. Corn-for-grain yields have slipped from 88 bushels per acre in 1973 to 55 bushels in 1974; 63 bushels in 1975, and 61 bushels in 1976, according to the U.S. Department of Agriculture Statistical Reporting Service.

The soybean yield was 20 bushels per acre in Missouri — the lowest since

1956.

To make matters worse, Missouri farmers raise a lot of cattle. "They could have had all the water they wanted and lost money," said one banker.

Crop yields in surrounding states were not so bad, giving Missouri farmers the worst of both worlds — comparatively low crop prices and low yields.

Meanwhile:

- The faltering crops are forcing cattle and hog raisers in the state to buy more feed, while other farmers are hauling water to wells, cisterns and ponds that are either dry or frozen.

- Cash receipts from crop farm marketings have fallen steadily since 1974, although livestock cash receipts are expected to offset that in 1976.

- The low water and ice on the Mississippi and Missouri Rivers have barge traffic at a standstill, paralyzing shipments of grain, fertilizer and other farm supplies.

- The USDA has paid out more than \$60 million in disaster payments to Missouri farmers who have experienced half crops the past three years. There are 110,995 full- and part-time farmers in Missouri, according to the U.S. Census Bureau. In 1976, 20,251 farmers were paid \$15.2 million in disaster payments (\$2.5 million for wheat, \$9.2 million for feed grain and \$3.5 million for cotton). That's below the 1974 total of \$32 million, but up from \$14.2 million in 1975.

- Many farmers are "living on land inflation": As lower crop yields and prices cut into farm profitability, farmers are borrowing more against their rising farmland values to get funds needed for the next crop year.

The FmHA, was making \$40 million in total farm loans in the early 1970s. In 1976, it will make \$100 million in loans — many of which are emergency loans. A substantial portion of the increase is related to dry weather, says Alan Brock of the FmHA.

The effects of dry weather in Missouri have been partially offset by the state's industrial economy. With St. Louis on the eastern edge of the state and Kansas City on the west, Missouri has a large amount of industry unrelated to agriculture. Yet farm economy still is important to Missouri.

Cash receipts from farm marketings totaled \$2.6 billion in 1975 compared to \$6.6 billion in Iowa. Missouri receives 53 per cent of its cash receipts from livestock and 47 per cent from crops. Missouri ranks second in the nation in the number of beef cows on farms and fourth in the number of hogs.

The USDA reported Missouri's 1976 corn crop at 173.8 million bushels, compared to 1.1 billion bushels in Iowa. It ranks fourth in the nation on soybeans — the state's major crop, according to the USDA.

Weather officials divide the state into six regions. At one time or another in the past three years, each region has been dry.

The worst portion of the state in 1976

was the central and west central plains section — where soybeans, corn, wheat, sorghum and other crops are grown along with livestock. Rainfall was 13.6 inches below normal in the west central plains during the last seven months of 1976. The area around Columbia, in the center of the state, only had one-half inch of rain during July and August.

In the northwest, the state's prime corn country, rainfall was 11.6 inches below normal during the last seven months of 1976. Below normal moisture levels in other areas were: 8.2 inches in the northeast, 5.8 inches in the west Ozarks, 8.3 inches in the east Ozarks (where lots of cattle are produced), and only 3.9 inches in the "Bootheel" area, where the state's cotton is grown.

A heavy snow in January helped, but the moisture shortage over the past three years has nearly drained Missouri's soil of its moisture reserves, which must be replenished for good growing conditions this season.

William Murphy, an agronomist with the University of Missouri's agricultural extension service, says the top four feet of Missouri's soil has the capacity to store eight inches of moisture. That soil is completely dry in most of the state, he says. Moisture reserves are normally replenished in the fall and winter months, and "we simply are not getting enough" to do the job, Murphy says.

Exactly what is needed? "Generalizations are hard to make,"

Murphy says. "A lot depends on if the rain is hard with a lot of run-off or if it's gentle; if the land is on a slope or not."

The clay beneath Missouri's top soil can be tough to penetrate, Murphy says, so a lot depends upon the condition of the clay.

Meanwhile, other businesses are beginning to feel some effects of the dry spell. Bud Golden of Golden International, Inc., a Columbia farm implement dealer, says the dry weather is beginning to hurt his business. He says farmers are tightening their belts. They are not trading in old equipment as fast and are cutting back elsewhere.

At Bourn Seed and Feed Co. in Columbia, Bob Bourn is pessimistic. "I suspect that dry weather will hurt me more this coming year than it has. Some of these boys are just going to quit growing corn."

"In this business, sometimes, drought is good for you because farmers have to buy more feed. But I recognize that's not good in the long run. I won't turn the business away. But it's not good."

Farm equipment dealers in central Missouri report interest in irrigation equipment is running high. Eddie Sydenstriker, a John Deere dealer in Mexico, northeast of Columbia, says there is a lot of irrigation in his area.

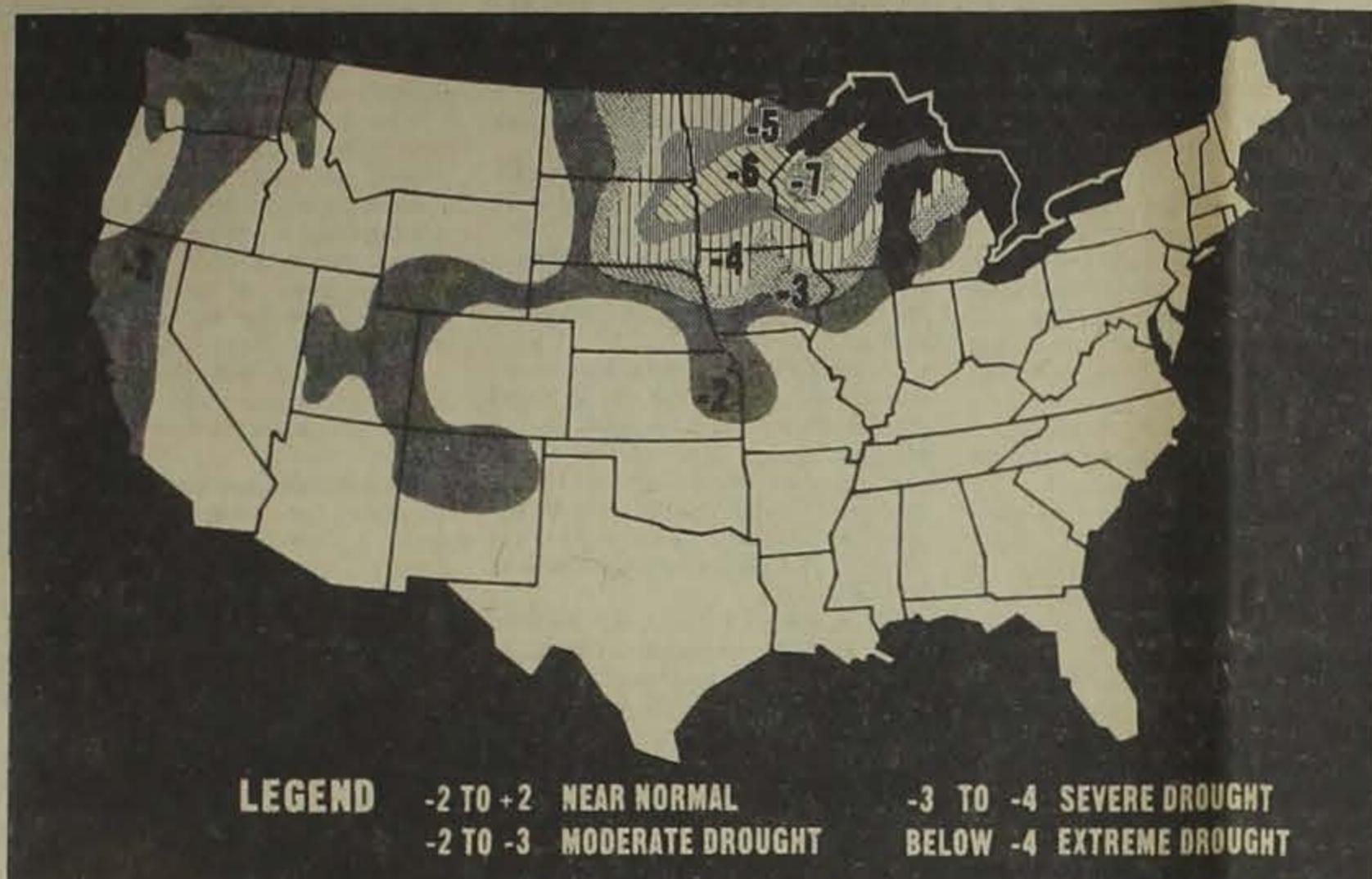
"We can still sell all of the Deere equipment we can get" because Deere still is allocating equipment, he says. "But that might change pretty soon."

ROUND-UP:

Oklahoma fears dust bowl/ Wisconsin worried/ Indiana okay
No snow in Colorado/ Kansas nervous/ Why won't it rain?

THE
THIRSTY
LAND

Other key states have variety of problems



This USDA index evaluates abnormally wet or dry weather. The index charts conditions as of Dec. 1, 1976. Note the most severely affected areas are located in the upper Midwest.

In Oklahoma, agronomists are worrying about another dust bowl.

In Colorado, there is no water in the mountains for irrigation.

"Without rain it will be a disaster here," says Wisconsin Agricultural Extension program chairman Don Peterson.

"Farmers are doing a lot of hoping — hoping that they can stay in business," says Oklahoma State University Agronomist Bill Tucker.

"At the moment it doesn't look very good," says John Stencil, president of the 8,000-member Colorado Farmers' Union. "And every day we have no rain, the situation gets more severe."

WISCONSIN

Wisconsin has been especially hard hit. Fifty-eight of the state's 72 counties have been declared disaster areas by the federal government, according to Keith Krueel of the state Agricultural Stabilization and Conservation Service. Krueel said he expects more than \$15 million in federal aid to come into the state before spring.

According to Krueel, Wisconsin farmers lost more than \$600 million in crop yields last year because of the drought — the figure was arrived at by comparing the 1976 yield to the average yields of 1970-1975.

Yearly rainfall in Wisconsin averages between 30 and 32 inches, according to Peterson. Last year, Wisconsin got less than 20 inches of rain, he said.

"Even if we have a normal rainfall year in 1977," he said, "our yields will

still be below normal. The ground is just so dry."

Peterson said the state needs rainfall 50 to 100 per cent above normal in the spring for farmers to recover.

The only bright spot this year is milk production, seven per cent higher than in 1975. And the number of milk cows remained about the same last year, state officials said.

Carol Spencer, who works for the State Crop Reporting Office, explained that milk production increased because the cows were receiving higher quality feed than in the past. Even though the hay crop was smaller than average, he said, the hay was of excellent quality because it hadn't gotten wet during the harvest.

But other officials warn that if the drought continues, farmers will be faced with paying even higher prices for feed, which will mean "a real financial crunch," says Peterson.

OKLAHOMA

Things are particularly bad for farmers in the northern half of Oklahoma, says OSU agronomist Tucker. He says normal rainfall ranges from 17 inches a year in the panhandle to 40 inches in the north. Last year, though, northern Oklahoma got only 60 per cent of normal rainfall.

As a result, the wheat crop planted last fall has grown very little. There was no wheat at all for grazing, Tucker said, and that usually represents as much as 50 per cent of the farmers' income.

If there isn't at least some rain in the

next month, there will be no wheat crop at all, Tucker said. About 3 to 4 inches of rain would insure a crop, he said. "If the weather stays like it," he added, "it won't be long until the soil starts blowing. And then we'll have a dust bowl."

"I'm talking about like the thirties. The wheat will be wiped out and the farmers will be wiped out with it."

COLORADO

In Colorado, farmers and ranchers consider some drought normal, says Colorado State University agronomist Jim Echols. In fact, says Echols, Coloradoans store up moisture in the soil by planting the same fields only every other year.

Without spring rains, though, there isn't enough moisture in the ground this year to finish the wheat crop, Echols said. In addition, without better than average rain and snow before spring, the spring crops — millet and grain sorghum — won't be planted. "Without rain we won't plant it. It's that simple," he said. There is no snow in the mountains, Echols explained, and the irrigation ditches usually fed from mountain streams and lakes aren't getting the needed moisture.

In addition, Echols said, pump irrigation, used widely in some areas of Colorado, has risen in cost as the price of natural gas (used to operate the pumps) has as much as tripled in the past year. "The profit margins are so slim," he said, "that it will be difficult for the farmers to continue. They will go bankrupt."



A small herd of dairy cattle roams one of many barren fields found in South Dakota. This field is near Ideal. Windmill stands motionless — another sign of drought conditions in the state.

Ranchers in Colorado also are in bad shape, Echols says. Because of the lack of rain, pastures were poor all summer, and the price of hay has skyrocketed. "Everything they buy costs more," he said. "And everything they sell they get less for it."

Some ranchers have been forced to sell as much as 10 per cent of their herds, officials say. "Most of them have sold their older cows and are down to their minimum herds," says George Ellicot, a Colorado Extension Service livestock specialist.

In addition, says Ellicot, the prices for cattle are very low. "A lot (of ranchers) are upset about the costs going up and the price of cattle just not being able to meet expenses," he said. Stencil, president of the Colorado Farmers Union, says he thinks many may be forced out of business if the weather doesn't improve.

TEXAS

In Texas, Extension Service agronomist John Box just sighs when he hears of the troubles in Colorado and Oklahoma. He's got other problems. Two thirds of Texas, he says, has too much rain.

"The eastern two thirds of the state is just sopping wet," he said.

Around St. Angelo, though, ranchers would like a little more rain, Box said, but the dry weather hasn't been severe enough to concern anyone. "The rainy season is still to come," he said, and farmers won't really know until then if their crops are in trouble.

Down near the Gulf Coast farmers are praying for dry weather, Box said. "It may sound funny coming from Texas," he said, "but that's the way it is this year." And if it doesn't stop raining, he said, these southern Texas farmers won't be able to plant their spring crops — grain sorghum and cotton.

INDIANA

In Indiana, farmers aren't too worried about the weather, says Purdue University agronomist Cliff Spies. "We are below normal in precipitation but we don't have any great concern at this point," he said, though, that without good spring rains Indiana crops would be reduced significantly.

Spies explained that while the surface is moist, subsoil moisture is only 50 to 60 per cent of what it usually is. And for this reason, above average or at least normal spring rains are necessary for a good crop.

Spies said that in 1976, precipitation levels ran above normal only in two months, but that was sufficient to make the corn crop the best in Indiana history — 110 bushels per acre.

KANSAS

In Kansas, Kansas State University agronomist Frank Bieberly says nothing can be said about the wheat crop until the spring. Bieberly explained that both the surface and the subsoil — particularly in the southern

part of the state — turned dry after last April. "The wheat is sitting there without moisture," he said. In addition, he explained, it turned cold early, and the wheat didn't develop top growth and is quite small. Bieberly also said he doesn't think the roots had a chance to develop properly. "We've got to have timely rain to get a crop... And if we don't get rain and top growth, we'll be in trouble," he said.

The southwest portion of the state is having the worst problems, Bieberly said.

Because the wheat crop hasn't grown, there hasn't been wheat for grazing. It was necessary for farmers to feed their cattle dry lot feed, he said, which is more expensive.

Wheat is the state's largest crop — some 13 million acres a year — and a crop failure would mean severe economic problems throughout the state.

NORTH DAKOTA

In North Dakota, some farmers are having problems and some aren't, says North Dakota State University Agronomist Nito Ramirez. It all depends, he says, on where you live and farm.

Those in the southeast portion of the state, he said, are in bad shape. But those in the north — particularly in the northwest — are experiencing rainfalls one to three inches above normal. In the southeast, he said, rainfall is 14 to 15 inches below normal. "The ground froze with very little moisture," he said. "And there is a minimum of snow cover. We need good spring rains and fall rains to turn this around."

Why won't it rain?

If you stop to think for a moment, it's a wonder that it rains at all. So many factors must come together under just the right conditions and at the right times, that rain — or snow — is a miracle of nature; a miracle without which life as we know it would not be possible.

Moisture must be present in the air. To condense, it needs microscopic specks of dust or salt. Air masses of different temperatures must collide to provide the cooling that will precipitate the moisture. Yet it may be so dry below that the resulting rain may never reach the ground.

Or it may fall in such torrents, or as hail, that it does more harm than good.

Most of the time it rains with such regularity we take it for granted. One reason Iowa is so blessed with abundance is that, most of the time, it rains just when the crops need it most.

But then it stops the fields lie dry, and the crops wither, and hope dies out of the land. Why?

No one knows. There are as many theories as experts and only time will tell who is right.

One explanation that has recently gained credence ties the recurrent droughts to a 20-year cycle of waxing and waning sunspots. These are huge, relatively cool areas on the sun that seem to affect its energy output.

Perhaps the foremost proponent of the sunspot theory is Dr. Louis Thompson, associate dean of agriculture at Iowa State University. He has studied weather and crop cycles for years.

The current drought, says Thompson, is the ninth that can be tied to the sunspot cycle since 1800. And tree-ring studies in the southwest have carried it back another 100 years, he said.

The exact nature of the link to sunspots still is a mystery, he says, but somehow the huge, dark spots seem to create a disturbed circulation pattern in the world's weather that cuts off the normal flow of moisture from the Gulf of Mexico into the interior of the continent.

This crucial circulation pattern provides the Midwest with its crop-growing rains — the warm, moist air from the Gulf condensing when it collides with cooler air masses out of Canada.

But for short periods in 1974 and 1975 and for a longer period last year, persistent high pressure blocked this northward flow of gulf air and diverted it — and its vital rains — to the east instead.

The result in Iowa was the driest May through December period in the 104-year history of climatic records. A state average of 13.90 inches of rain fell in that period, hardly more than half the normal.

Only by drawing on the last reserves of moisture in the soil did the crop survive. But now that critical reserve is gone.

Will the drought persist through 1977? Past records indicate that it will, says State Climatologist Paul Waite.

"The records show there is a high probability that a dry spring and a dry summer will follow on a cold, dry winter," Waite said. Of 12 dry winters in the last 102 years, 10 were followed by a dry spring and seven by a dry summer as well, he said.

The crucial period to watch is the four to six weeks in the spring — in March and early April — after the frost has left the ground, says Richard Felch, an agricultural meteorologist with the National Weather Service in Washington, D.C., and an ISU graduate.

There will probably be enough moisture in the top few inches of the soil from the winter snows to get the plants sprouted, he said, "but there will be stunted fields by June without an adequate moisture supply."

Soil moisture deficiencies run as high as 6-8 inches in the north and west parts of Iowa, the areas hardest hit by the drought. But even the southeast corner, which so far has fared the best, is deficient by 3 to 4 inches.

"Iowa will need considerably more than normal spring rains for a good crop," Felch said. It is more usual to

make up such a deficiency over a period of several years during which rainfall gradually gets back to normal.

When the rains fail and the fields lie parched, the wind takes over and the dust rises in clouds that obscure the sun. The worst such storms this country has ever seen occurred in the 1930s drought, which caused an estimated \$5 billion in damage to U.S. agriculture.

The devastating storms seldom struck Iowa during the 30s; it never got that dry here. But modern, bare-field farming methods are an ever-present threat.

There is one theory on which all the experts seem to agree — that no matter how short or long the current drought lasts, Midwest weather will never be the same.

"It is very widely accepted," Thompson said, "that the benign period that started in 1890 has ended and that we can expect much more variability in the weather from now on."

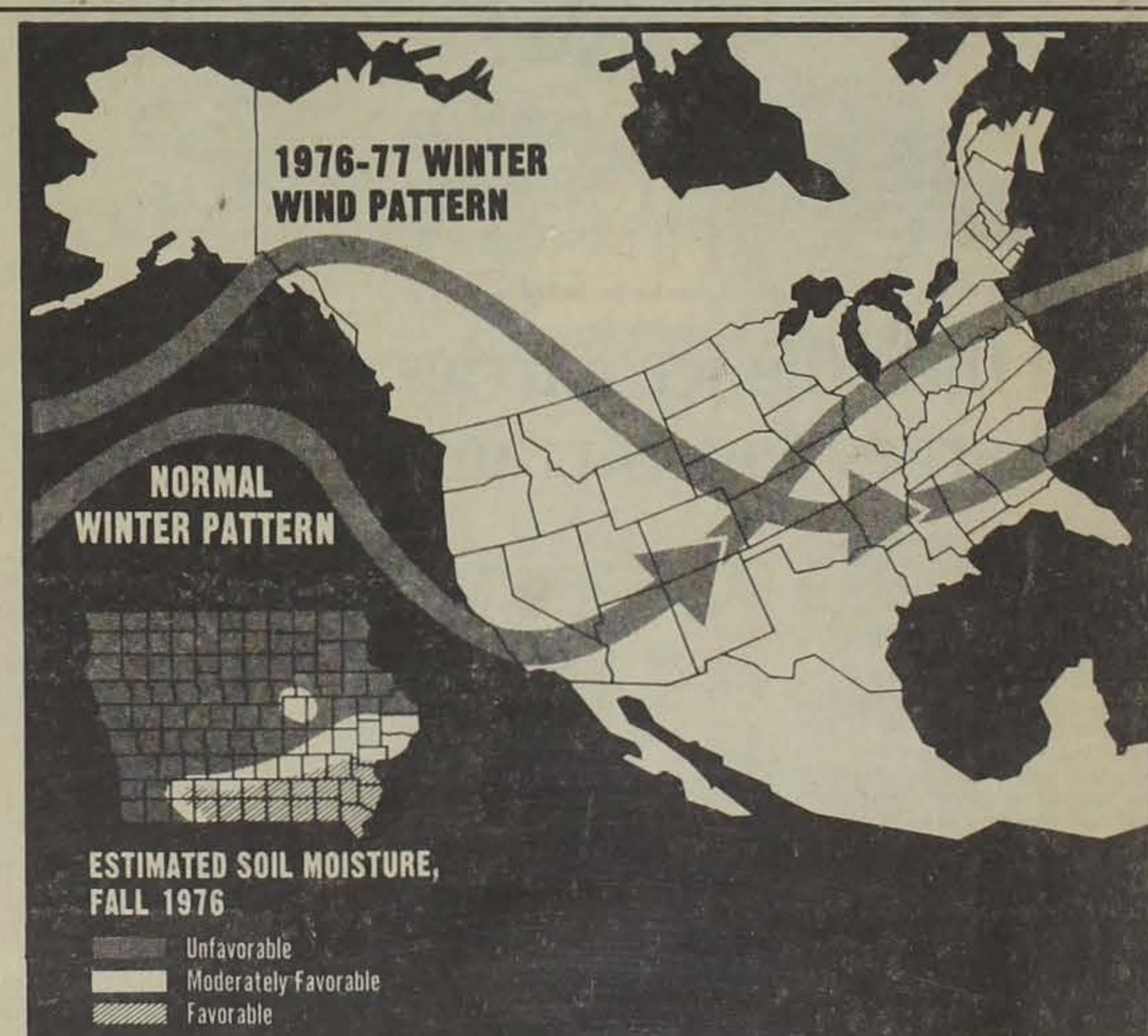
One result, he said, would be a 3 per cent drop in crop yields simply because of the varied weather. Farming would become an even more high-risk occupation than now.

Winters, said climatologist Waite, will be more like the period 1870-90, when they were much more severe.

It is not just that the climate of the Midwest is changing; the experts believe there is a world-wide pattern of change. Part of it may be tied to a slow drop in the world's average temperature and part to a slight drop in the amount of sunshine that falls on the earth. Or perhaps the two are inter-related. Both may be caused by man's pollution of the atmosphere.

The National Center for Atmospheric Research reports that in the last 30 years alone, the world's temperature dropped by half a degree Celsius. The drop may seem insignificant, but it is estimated that that rate of cooling persists, it will take only about 250 years to return to an Ice Age climate, where more snow falls in winter than melts in summer.

Though the present period of rela-



Normally, jet stream sweeps southward along Pacific Coast. But this winter it has swung far to the north, bringing Arctic air to the nation's heartland. Inset: Iowa soil moisture readings.

tively good weather seems normal because we have lived through it, records preserved in the deep-sea sediments indicate that over the last 700,000 years, global water temperatures have been this warm only five per cent of the time.

This marine record, according to University of Miami scientists, shows a regular succession of major ice ages at intervals of about 100,000 years, with periods of relative cool and warmth alternating at about 20,000-year

intervals. The 6,000 years of human history so far coincides with the highest temperatures in the last 100,000 years, and the last 1,000 years of history represent a definite peak on the temperature chart, these experts say.

Seen on this scale, the present period should be viewed as the most abnormal in at least 1,000 years instead of the normal.

Can man alter this pattern? Perhaps. There are indications that he has

already done so inadvertently by polluting the atmosphere. But his deliberate attempts at weather modification through cloud-seeding have shown inconclusive results.

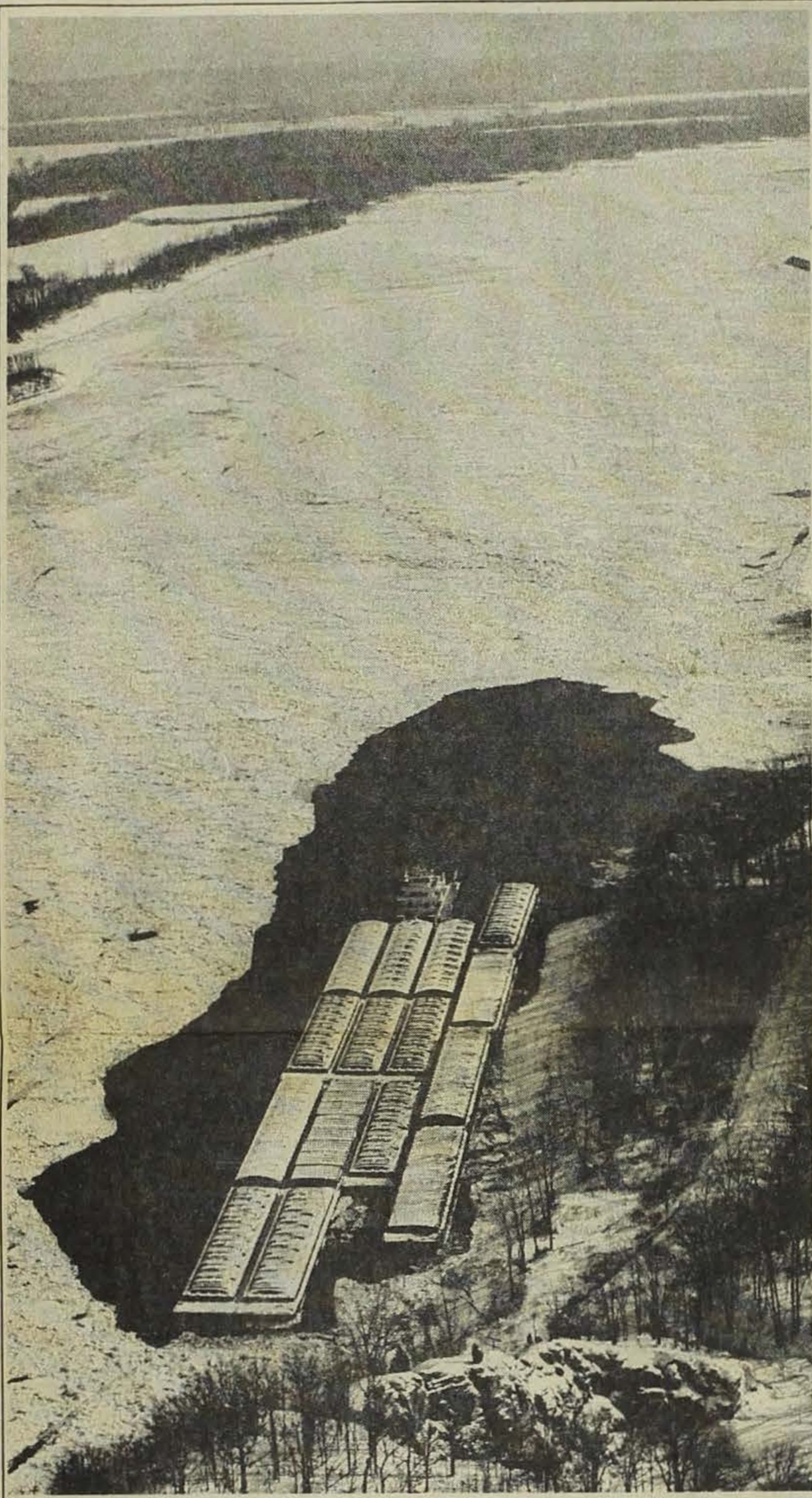
The world's weather occurs on such a vast scale that it would seem beyond all human efforts to understand it, much less control it.

For many, life has become so regulated that the weather of the day provides the only uncertainty. With that gone, life would be drab, indeed.

ILLINOIS:

Overall outlook good/ Mississippi low/ Ground moisture short/ Ice jams
Some areas dry/ Rail car shortage?/ Barges trapped/ Fertilizer woes?THE
THIRSTY
LAND

Illinois looks like a garden spot



Mississippi River near Cape Girardeau, Mo., has barges locked in its icy grip.

And then the ice carries the barges downstream...

CHESTER, ILL. — John Fox leaned back in the captain's chair of the "Denis Brown" tug boat he pilots and said in an exasperated tone: "I've never seen anything like it; it's just unbelievable."

The "it" he was talking about is a stretch of the Mississippi River from St. Louis, Mo., south to Cairo, Ill. Low water and frigid temperatures have made that part of the river a treacherous string of ice gorges, one of which stretched more than 50 miles north of Cairo.

So bad did the going become recently on the Denis Brown's month-old trip north from New Orleans that Fox stood helplessly at the controls of the Denis Brown as a massive ice jam snapped in half one of 11 barges it was towing, spilling tons of salt into the waters near Chester.

Said the 10-year veteran tug boat pilot: "It's the insurance company's now. I called my boss and told him we lost a barge and I can't go back and get it. Its gone; it sunk."

The Mississippi freeze has the river industry near St. Louis at a virtual standstill. The U.S. Coast Guard has closed the river to traffic from St. Louis to Cairo, Ill., about 160 miles to the south. Scores of companies and industries dependent on the river also have closed down.

Fox said the Denis Brown was forced to pull to the side of the river near Chester, about 90 miles south of St. Louis, because it ran short of fuel oil, food and water. Normally, such stops

are not made, for the boat makes the New Orleans to St. Louis round trip in 16 days, he said. This time it had been out a month and still hadn't made St. Louis.

Fox described the problem as a combination of low water and ice. Ice in a river as low as the Mississippi forms the huge gorges that make navigation treacherous, Fox said. He described massive slabs of ice that glide down the river, plow into barges, spin them sideways, slide beneath them and lift the 1,500-ton vessels out of the water as if they were feathers.

"The barges just start floating down the river on the ice," Fox said, "it's unbelievable." In no time at all, according to Fox, the barges are immobilized in ice jams.

Fox said the Denis Brown's trip to St. Louis already had been slowed by low water, but that it hit real trouble just south of Chester.

"The office (D.B. Towing Co. of Stillwater, Minn.) called on the marine radio," recalled the cook, Henry Childress, "and told us to turn around and get to Cape Girardeau because of the weather."

"That's when we got caught in the ice. When we tried to turn. That ice just picked up the barges and us and away we went. At one point, I looked out of the window (of the Denis Brown) and we were six, eight feet out of the water. I could look down at the shore over there," Childress said pointing out the galley window of the boat.

Fox said he freed the boat from the ice and then went about the task of freeing the 11 barges, which by then were stuck in the ice further down the river.

"You just get to the ice and splash water on it (with the paddles that normally propel the boat) until you get the barge free," said Fox. He said it took four to five days to free the barges and the Denis Brown, whose deck, by then, was caked with ice. One portion in the front was covered with four feet of ice, Fox said.

The barge loaded with salt got stuck and ice piled on top of it until it broke in half.

"Riverboat people get scared of ice like this," said Fox, who is from Mississippi. "They might joke about it and stuff like that, but it scares them."

Fox says he and a skeleton crew of four will stay near Chester and wait until the ice melts, raising the level of the river enough to get the 10 remaining barges of fertilizer to the Eagle Fleet Co. in St. Louis. "Where it goes from there is up to them," he says.

Meanwhile, Fox's boss has lost a lot of money. "You have \$700 a day in wages on this boat," Fox says, adding that the crew normally works 18 days on and 18 days off. The losses might be offset somewhat by insurance, but his boss will bear a heavy share. He said that an idle barge can cost an owner up to \$2,000 a day, although other barge company officials said they didn't think the cost would run that high.

There is no wholesale hauling of water, no statewide drought task force, and few areas of dried-up farm ponds in Illinois. Some are calling Illinois the garden state of the Midwest compared to the troubles other states are having with drought.

Dr. Richard Johnson, University of Illinois agronomist and a Sac County, Ia., native, said the state is not recommending that farmers alter planting intentions or planting rates this year.

"There is no basis at all to set up any panic situation in Illinois," said Johnson.

"Any recommendations to adjust for drought conditions in Illinois are not justified at this time," he said.

If there is any worry over moisture heading into 1977, it sure hasn't surfaced in land prices. Land sales are setting records, with one 160-acre farm in the central part of the state selling for \$4,000 an acre.

It's been a little drier than normal, to be sure. Rainfall in 1976 was said to be nine inches below normal on a statewide basis, and some areas reported deficiencies up to 15 inches.

But Illinois is a much "wetter" state than those to the west. Normal rainfall in Illinois is up to seven inches more a year than in some areas of Iowa.

So Illinois' moisture conditions can be considerably below average and still be sufficient to produce bumper crops. That was the situation in 1976.

"The first three months of the year were near normal for rainfall," said Stan Changnon, head of the state water survey at the University of Illinois at Champaign-Urbana. "This was followed by a nine-month dry period."

"But crop yields were quite high. July rains came at a critical time and there weren't as many 90-degree or above days, so the stress on the crops was lessened."

Illinois farmers averaged 107 bushels of corn per acre in 1976,

compared to 116 in 1975. Soybeans averaged 32 bushels in 1976 compared to 35.5 in 1975.

Those 1975 figures were the state's all-time record yields, so 1976 was far from being a bad crop year.

Jim Kendall, in charge of the U.S. Department of Agriculture's crop reporting service in Springfield, Ill., said, "Our farmers are better off than we ever thought they were going to be. We were hurt in production, but not too badly."

Changnon's records show that northwestern Illinois received 19.4 inches of rainfall during the nine-month period of April through December, or 64 per cent of normal. West-southwest Illinois received 18 inches of rainfall, or 57 per cent of normal. East-southeast received 19.4 inches, or 63 per cent of normal.

Other areas of the state received more than 20 inches of rainfall, or more than 70 per cent of normal.

What it meant was that while some isolated areas suffered extreme crop losses, production in most of the state was good.

One of the drier areas was south-central Illinois.

Earl Schwarm, a farmer at Loogootee, which is in that area, said corn yields were reduced by about half of 1975's crop, and soybeans fell by about a third.

But state officials report that conditions — even in the drier areas — are far better than in the real droughts of the 1930s and 1950s.

"One thing to remember is that these dry months we have had have not been the worst in the history of Illinois," Changnon said. "But it's been 20 years since we've had anything of this magnitude, so people assume the worst. It could be a lot worse. The 1930s were much worse."

Ellis Sanderson, also of the water survey, added, "The shallow wells that

we monitor are two to seven feet below normal. But we still haven't reached the 1962-64 levels yet. And the levels certainly aren't as bad as in the 1950s."

There is still some caution among farmers, however.

Lewis DeGraff, a farmer at Lanark in the northwest corner of the state, says farmers "are being more selective on the varieties of seed corn and soybeans they will be planting this year, and are talking about cutting down on (plant) populations."

And there is worry about water supplies in certain areas of the state where the water source is limited anyway.

"Illinois is flat, and many towns have to depend on reservoirs in many areas," says the crop reporting service's Kendall. "The farmers in those areas, in turn, depend on the towns as a back-up water source. Many towns have become hesitant to sell from their supplies."

Put it all together and what it seems to indicate is that Illinois farmers — though their normal optimism is tempered by the conditions in neighboring areas — seemed destined to retain the coveted "corn crown."

Sewer bonanza

MINNEAPOLIS, MINN. — If you make a living off sewer lines, a drought can be a good thing.

In Minneapolis and St. Paul the dry weather last summer meant a bonanza for the Roto-Rooter Sewer Service Co. That happened because thirsty trees sent roots out in search of water — and found it in someone's sewer line.

"We had planned for maybe 3 to 5 per cent growth this year," said one company official. "What we got was about 30 per cent."



Above: Towboats National Freedom (left) and Dennis Brown take on fuel at Chester, Ill., before battling ice sheets on the river.



Left: Crew of the Denis Brown, (from left) John Fox, Jimmie Franklin and Rich Walters, show concern over halted barge traffic on Mississippi.

... As Mississippi is at 10-year low

The Mississippi River is at its lowest level in 10 years, according to the U.S. Army Corps of Engineers.

One can now stroll across the Mississippi at St. Louis, Mo., the first time since 1940 the river has frozen solid there.

"The mean stage at St. Louis, determined from 113 years of records, is 7.2 feet in October, 6.9 feet in November and 4.8 feet in December. This past year the river stages were .9 feet in October, .7 feet in November and minus .7 feet in December," said Mel Doernhoefer, public information officer for the Corps.

The combination of low water and cold weather has caused massive ice gorges to form between St. Louis and Cairo, Ill., halting barge traffic until the channel can be cleared.

Tom Gladder, owner of Gladder's

Towing Co. at St. Louis, said, "If the river doesn't open up soon there's going to be a short supply of anhydrous ammonia (for fertilizer) this spring. And the weather isn't encouraging."

Another result could be a shortage of rail cars.

John Harvey, spokesman for Archer Daniels and Midland, headquartered in Decatur, Ill., and one of the largest soybean processors in the U.S., said, "The situation can be aggravated rapidly. The rail car supply is starting to get short. The only way for grain to move, domestically or for export, is by rail car."

"I hope I'm just crying wolf, but I'm afraid we may be faced with a critical, short-term, rail car shortage," he said.

Harvey said that unfavorable weather in many parts of the country has prevented trucking from taking up

much of the slack, thus putting more pressure on rail cars.

Pete Fanchi, of Federal Barge Lines at St. Louis, said at least 400 barges and 40 boats are stalled at Cairo. "I can't remember seeing this combination of low water and cold weather before," Fanchi said. "We had low water all year, but we could cut down on the tow size and move. I'd rather have that than this."

Even with low water, barges moved record amounts of tonnage last year.

Doernhoefer added that last year was not the worst period in recent years. During the 1963-64 season the Corps recorded 37 straight days of river stages lower than minus 3.5 feet.

However, the water level was low enough last year that the Corps had to conduct 24-hour dredging operations to keep the channel clear.