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Multiple Peril Crop Insurance: What Is It? Should You Buy It for Your Spring Seeded Crops?

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MULTIPLE PERIL CROP INSURANCE:

WHAT IS IT?

SHOULD YOU BUY IT?

Gerald Toland and Burton Pflueger[1]

Introduction

Do you remember the year you experienced severe drought or the hail storms that have hit your farm? Adverse events like these reduce your crop yields and/or quality, and can have a significant impact on your cash flow and net worth. Unfortunately, there are many adverse events including drought, excessive temperatures at pollination, excess moisture, flood, wind, frost, hail, disease, pest outbreaks, and fire which are largely outside your control.

Figure 1 depicts why corn crops have failed in South Dakota, as measured by the multiple peril crop insurance claims experience from 1981 to 1986.[2] How do these patterns compare to your experience?

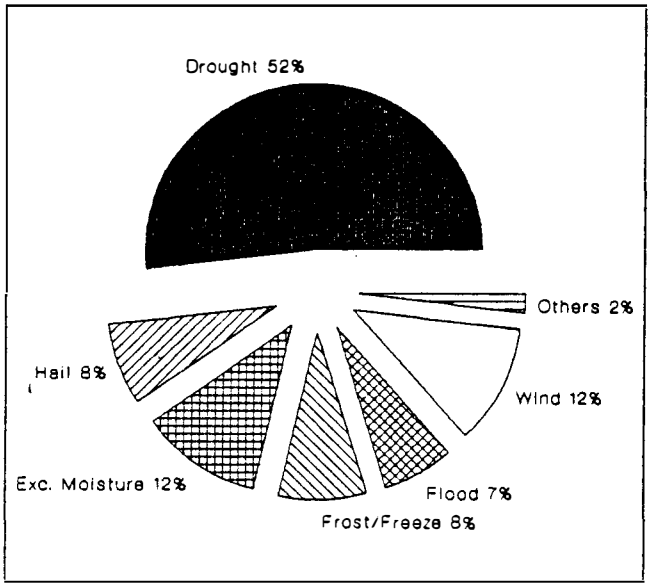

Fig. 1 Why Corn Crops Fail in South Dakota

Fortunately, there are risk reducing strategies that you as a manager can use to reduce the impact of these adverse events. Examples include: diversification or growing more than one crop (don't put all your eggs in one basket); use of land tenure arrangements in which you share your risk with others, such as share rental arrangements; use of drought and disease resistant varieties and selecting varieties to reduce risk; use of prudent weed and pest control measures; and purchase of multiple peril and/or hail and fire crop insurance. Are you currently using any of these strategies to control your exposure to risk?

The purposes of this fact sheet are: (1) to describe the basic features of multiple peril crop insurance (MPCI), with emphasis on its role as a tool for reducing your financial risk; and (2) to describe a budgeting procedure that you may find useful in assessing whether you should buy crop insurance protection.

Our focus will be on the impact of the purchase of MPCI on your farm's net cash flow and balance sheet should an adverse event arise. Specific details of MPCI contract provisions should be discussed with a qualified crop insurance agent.

What is Crop Insurance? Should You Buy It?

Crop insurance is available in two forms: (1) limited peril insurance, including commercial hail and fire insurance; (H/FCI); and (2) multiple peril crop insurance (MPCI).

H/FCI is offered under two types of plans--spot and area. Spot (acre-by-acre) plans pay you for losses based on the percentage loss occurring due to hail/fire on your damaged acres. Normal yields on non-damaged fields do not reduce payments. In contrast, area hail and fire plans pay you for losses based upon the percentage of yield loss due to hail/fire averaged across your insured unit.

MPCI guarantees a minimum average yield per acre for the insured crop for the insured unit, with the minimum determined by the deductible you choose. If your average yield (adjusted for quality) for the insured unit falls below the level specified in your insurance policy, the insurance company agrees to pay you the difference.

The guarantees are based on commonly accepted standards for good quality grain. To calculate an actual yield for insurance purposes harvested yields are adjusted for quality factors such as grade, kernel quality and moisture level.

Crop insurance may be attractive to you because:

1. It represents an opportunity to substitute a known cost (annual premiums) for unpredictable and irregular yield losses, particularly catastrophic losses. You can **transfer** a portion of your yield risk to the insurance industry.

2. It **stabilizes** your farm's cash flow, thereby making you a lower risk borrower. This may improve access to and terms for borrowed money.

3. It may provide the **financial liquidity** needed to remain in farming for another year in the event of a significant crop yield loss.

4. It may increase the attractiveness of cash **forward contracts and hedging using futures** since your risk of not being able to perform in accordance with the contract is reduced.

Major factors which influence your MPCI purchase decision include:

1. Your family's financial capacity to withstand a significant crop yield loss; that is, adequate net worth on your balance sheet to self-insure.

2. Your family's willingness to take risk; that is, your family's attitude toward the trade-off between greater average profit vs. lower risk. Typically, plans with lower risk generate less average profit.

3. The **effectiveness** of the yield guarantee. That is, the **probability** or chance that your actual yield will fall below your yield guarantee.

4. The **expected benefits** of the insurance due to risk reduction versus the annual premium cost.

5. The purchase of MPCI may affect your **eligibility** for USDA programs such as emergency low interest loans.

Development of the Multiple Peril Crop Insurance Program

The federal government (USDA), and to a limited extent, the private industry have sponsored some form of multiple peril crop insurance since 1938. However, until recently MPCI was available for only a few crops in a limited number of counties. The goal of the Crop Insurance Act of 1980 was to make crop insurance available to growers of major crops as a replacement for the USDA's low-yield disaster program. The Farm Bill of 1985 takes that goal a step further. Beginning with crops harvested in 1987, if MPCI is available in your county you will not be eligible for emergency low-interest loans. Multiple peril crop insurance is offered on all ASCS program crops and is now available on most other commercial crops. Table 1 depicts the crops that are insurable by county in South Dakota.

Basic Features of Multiple Peril Crop Insurance

How Is It Marketed?

Crop insurance is marketed by local crop insurance agents who, in most cases, sell crop insurance along with other lines of insurance. The objective of these agents is to provide a full range of insurance protection from crop insurance to farm/home owners policies to meet farmers' risk management needs.

If a farmer's yield faces a number of risks, the agent will likely recommend the multiple peril coverage which provides protection on most crops against practically all unavoidable causes of loss. If the primary risk is hail/fire damage, then the agent will likely recommend commercial hail/fire crop insurance (H/FCI). It is also becoming common to develop a blend of multiple peril and commercial crop and fire protection into a comprehensive package. The H/FCI, in effect, provides coverage for the hail and fire risks for the deductible of the MPCI and the MPCI expands the range of perils of H/FCI.

TABLE 1.

Crops Insurable By County

The following talbes reflect the coverage available in South Dakota beginning with the 1988 crop year

CODE	COUNTY	WINTER CROPS	SPRING CROPS
003	Aurora		Bly,Crn,GrS,Oat,Soy,Sun,Wht
005	Beadle	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
007	Bennett	Wht	Bly,Crn,GrS,Oat,Sun
009	Bon Homme		Bly,Crn,GrS,Oat,Soy,Wht
011	Brookings		Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
013	Brown	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
015	Brule	Wht	Bly,Crn,DyB,GrS,Oat,Soy,Sun
017	Buffalo	Wht	Bly,Crn,DyB,GrS,Oat
019	Butte	Wht	Bly,Crn,DyB,GrS,Oat,Sun
021	Campbell		Bly,Crn,Flx,GrS,Oat,Sun,Wht
023	Charles Mix	Wht	Bly,Crn,GrS,Oat,Soy,Sun
025	Clark	Rye	Bly,Crn,Flx,GrS,Oat,Pot,Soy, Sun,Wht
027	Clay		Bly,Crn,DyB,GrS,Oat,Soy,Wht
029	Codington	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
031	Corson		Bly,Crn,Flx,GrS,Oat,Sun,Wht
033	Custer	Wht	Bly,Crn,GrS,Oat
035	Davison		Bly,Crn,GrS,Oat,Soy,Sun,Wht
037	Day	Rye	Bly,Crn,Flx,Grs,Oat,Soy,Sun, Wht
039	Deuel	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
041	Dewey	Wht	Bly,Crn,Flx,GrS,Oat,Sun
043	Douglas		Bly,Crn,GrS,Oat,Soy,Sun,Wht
045	Edmonds	Rye	Bly,Crn,Flx,Grs,Oat,Sun,Wht
047	Fall River	Wht	Bly,Crn,DyB,GrS,Oat
049	Faulk	Rye	Bly,Crn,Flx,GrS,Oat,Sun,Wht
051	Grant	Rye	Bly,Crn,DyB,Flx,GrS,Oat,Soy, Sun,Wht
053	Gregory	Wht	Bly,Crn,GrS,Oat,Sun
055	Haakon	Wht	Bly,Crn,Flx,GrS,Oat,Sun
057	Hamlin	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
059	Hand	Wht	Bly,Crn,Flx,GrS,Oat,Sun
061	Hanson		Bly,Crn,GrS,Oat,Soy,Sun,Wht
063	Harding	Wht	Bly,Crn,Flx,GrS,Oat,Saf,Sun
065	Hughes	Wht	Bly,Crn,DyB,Flx,GrS,Oat,Pot, Soy,Sun
067	Hutchinson		Bly,Crn,GrS,Oat,Soy,Sun,Wht
069	Hyde	Wht	Bly,Crn,Flx,GrS,Oat,Soy,Sun
071	Jackson	Wht	Bly,Crn,GrS,Oat
073	Jerauld		Bly,Crn,GrS,Oat,Wht
075	Jones	Wht	Bly,Crn,GrS,Oat
077	Kingsbury	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
079	Lake		Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
081	Lawrence	Wht	Bly,Crn,GrS,Oat
083	Lincoln		Bly,Crn,DyB,GrS,Oat,Soy,Wht
085	Lyman	Wht	Bly,Crn,GrS,Oat,Sun
087	McCook		Bly,Crn,GrS,Oat,Soy,Sun,Wht
089	McPherson	Rye	Bly,Crn,Flx,GrS,Oat,Sun,Wht
091	Marshall	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
093	Meade	Wht	Bly,Crn,GrS,Oat,Sun
095	Mellette	Wht	Bly,Crn,GrS,Oat,Sun
097	Miner		Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
099	Minnehaha		Bly,Crn,DyB,GrS,Oat,Soy,Wht
101	Moody		Bly,Crn,Flx,GrS,Oat,Soy,Wht
103	Pennington	Wht	Bly,Crn,GrS,Oat
105	Perkins	Wht	Bly,Crn,Flx,GrS,Oat,Saf,Sun
107	Potter	Wht	Bly,Crn,Flx,GrS,Oat,Sun
109	Roberts	Rye	Bly,Crn,DyB,Flx,GrS,Oat,Soy, Sun,Wht
111	Sanborn		Bly,Crn,GrS,Oat,Sun,Wht
113	Shannon	Wht	Bly,Crn,GrS,Oat,Sun
115	Spink	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
117	Stanley	Wht	Bly,Crn,Flx,GrS,Oat,Sun
119	Sully	Wht	Bly,Crn,DyB,Flx,GrS,Oat,Pot, Soy,Sun
121	Todd	Wht	Bly,Crn,GrS,Oat,Sun
123	Tripp	Wht	Bly,Crn,GrS,Oat,Sun
125	Turner		Bly,Crn,GrS,Oat,Soy,Wht
127	Union		Bly,Crn,DyB,GrS,Oat,Soy,Wht
129	Walworth		Bly,Crn,Flx,GrS,Oat,Sun,Wht
135	Yankton		Bly,Crn,GrS,Oat,Soy,Wht
137	Ziebach	Wht	Bly,Crn,Flx,GrS,Oat,Sun

KEY TO CROP ABBREVIATIONS

Bly/Barley, Crn/Corn, DyB/Dry Beans, Flx/Flax, GrS/Grain Sorghum, Oat/Oats, Pot/Potatoes, Rye/Rye, Saf/Safflowers, Soy/Soybeans, Sun/Sunflowers, Wht/Wheat

What Causes of Yield Losses are Covered?

MPCI on most crops covers unavoidable production losses caused by:

1. Drought
2. Excessive moisture
3. Hail
4. Wind
5. Frost/freeze
6. Tornado
7. Lightning
8. Flood
9. Insect infestation
10. Plant disease
11. Excessive temperature during pollination
12. Wildlife damage
13. Fire
14. Earthquake

MPCI does not cover losses resulting from:

1. Poor farming practices
2. Low commodity prices (e.g., crop was not harvested because it was not worth harvesting)
3. Theft
4. Specified perils which are excluded in a limited number of policies.

There are specific restrictions on some crops based upon acceptable farming practices. There are restrictions on planting dates for many crops. However, in many instances, reduced coverage can be obtained for the base premium if late planting occurs. See a qualified insurance agent for details.

How Much Coverage Can be Purchased?

There are two decisions that determine the amount of coverage: (1) the level of coverage (i.e., the amount of deductible) and, (2) the price at which yield losses are converted to cash.

Your **insurance yield** is based on your **actual production history** (APH) which is an estimate of your 10-year average yield on the insurance unit.. APH provides coverage based upon your proven performance record, not county averages. Information on the records required to establish an APH yield is available in publication entitled "Production Management System". For a copy or additional assistance on organizing yield records for crop insurance purposes contact your local extension office or the author of this bulletin.

Level of Coverage. You have the option of insuring at one of three coverage levels:

1. 75% your insurance yield (i.e., 25% deductible)
2. 65% your insurance yield (i.e., 35% deductible)
3. 50% your insurance yield (i.e., 50% deductible)

MPCI payments are made if yields fall below your insurance guarantee.

Your yield guarantee per acre is equal to:

Insurance yield x coverage purchased (i.e., 50%, 65%, or 75%)

Let's use non-irrigated corn as an example. If your insurance yield is 82 bushels per planted acre and you purchase 65% coverage (35% deductible), your yield guarantee would be:

82 bu./acre x 0.65 = 53.3 bu./planted acre.

Commodity Indemnity Price Elections.

You must select one of three indemnity price elections to convert yield losses into cash. For example, the 1988 low, medium, and high price elections for corn are $1.25, $1.50 and $2.00, respectively. The price elections for all crops in South Dakota are presented in Table 2.

How are Indemnity Payments Calculated?

If your average yield (adjusted for quality) is greater than your yield guarantee, no indemnity is paid. If your average yield per acre is less than your yield guarantee, the indemnity paid is equal to:

(Yield guarantee - average yield for insured unit) x indemnity price.

Table 2. Price Elections Available for South Dakota Crops, 1988

	Unit	Price Election—Low	Medium	High
Barley	bu.	$1.00	$1.25	$1.50
Corn	bu.	1.25	1.50	2.00
Dry Beans	lb.	.10	.12	.14
Flax	bu.	3.00	4.00	4.50
Grain Sorghum	bu.	1.25	1.50	1.85
Oats	bu.	.60	.80	1.05
Potatoes	cwt.	2.00	2.50	3.10
Rye	bu.	.80	1.20	1.65
Safflower	lb.	.05	.06	.07
Soybeans	bu.	3.00	4.00	5.00
Sunflowers	lb.	.05	.06	.07
Wheat	bu.	2.00	2.25	2.60

For example, using our previous case example, if your yield was 34 bu./planted acre your indemnity payment would be:

(53.3 bu/acre yield guarantee - 34 bu./acre realized yield) x $2.00/bu. indemnity price = $38.60/planted acre.

Indemnity payments are a taxable income.

What Does Multiple Peril Crop Insurance Cost?

Premium rates are based on your historical yields and the loss history for the county in which you farm. The premium rate, as a percent of the dollar value of protection, varies with your 10 year average yield level. Table 3 depicts the premium rate structure for corn in Lake County in South Dakota.

You have the option of buying MPCI with or without hail and fire coverage. However if you choose to opt out of the hail and fire insurance component of MPCI, an equivalent dollar amount of hail and fire coverage must be purchased as a separate hail and fire policy.

Premiums are generally due around the normal harvest period and if not paid within 30 days of billing, interest may be charged for late payment. Premium payments are a tax deductible expense.

To encourage broader participation, Congress authorized a **30 percent subsidy** for premiums at the 50 percent and 65 percent coverage levels which is

Table 3. Multiple Peril Crop Insurance County Coverage and Rate Table

State: South Dakota County: Lake
Crop: Corn Practice: Non-Irrigated

Approved Insurance Yield	Subsidized Premium Rates With Hail and Fire Protection(%)	Without Hail and Fire Protection(%)
COVERAGE LEVEL 1(50%)		
29 & Below	7.3	5.3
30-37	6.3	4.4
38-45	5.1	3.6
46-54	4.3	3.0
55-62	3.9	2.7
63-71	3.5	2.5
72-79	3.3	2.3
80-87	3.1	2.2
88 & Above	3.0	2.1
COVERAGE LEVEL 2(65%)		
29 & Below	10.1	8.1
30-37	5.8	6.7
38-45	47.1	65.0
46-54	6.0	4.2
55-62	5.4	3.8
63-71	4.9	3.4
72-79	4.6	3.2
80-87	4.3	3.0
88 & Above	4.2	2.9
COVERAGE LEVEL 3(75%)		
29 & Below	18.4	15.6
30-37	16.0	13.5
38-45	12.9	10.5
46-54	11.0	8.6
55-62	9.8	7.4
63-71	8.9	6.5
72-79	8.3	5.9
80-87	7.8	5.5
88 & Above	7.6	5.3

Note: The premium per acre is calculated as follows:
Insurance yield x coverage level x indemnity price selected x premium rate.

included in the quoted rates. However, if you choose 75 percent coverage, you must pay the full additional premium cost over the 65 percent level. You also benefit from the federal government

paying all of the administrative costs to operate the program. These two subsidies reduce your premium cost by about 50%.

Your premium per acre is calculated as follows:

Yield guarantee x indemnity price selected x premium rate.

For example, if we use our case example yield guarantee of 53.3 bu./acre, an indemnity price of $2.00/bu. and a premium rate of 4.3% the premium is:

53.3 bu./acre x $2.00/bu. x 0.043 = $4.58/acre

The 4.3% premium rate is based upon 65% coverage. The rate is circled in Table 3.

Do I Have To Insure All of My Crop?

If you purchase MPCI for a particular crop, all of that crop you are raising in the same county must be insured. It is not possible to just insure the portion of a crop that is most susceptible to loss. However, each crop is insured separately, so you may insure one crop without having to insure a second crop produced in the same county. A qualified crop insurance agent can define the insurable units for the land you farm.

Claims are paid by farm unit. A single farm (located in one county) represents one unit. If you crop-share rent a second farm, the rented acreage constitutes a second unit. Providing proper records are maintained, you may qualify for more than one unit if your land is located in separate sections.

When Must MPCI Be Purchased?

MPCI must be purchased by the date specified as the end of the sales period. In South Dakota the closing date for fall seeded crops is September 30, and April 15 for spring seeded crops.

When Must Hail & Fire Coverage Be Purchased?

In contrast to MPCI, H/FCI protects up to the "Actual Cash Value" of the crop (80 bu. of corn x $1.50 = $120). This protection can usually be purchased anytime during the growing season with a 24-48 hour delay of insurance going into effect.

Analysis of the MPCI Purchase Decision

We previously discussed the considerations in the decision process. They include: financial capacity to bear risk, the willingness to bear risk, the effectiveness of the yield guarantee, expected benefits and eligibility for USDA programs. In this section we develop budgeting procedures to help you evaluate these factors for your farm.

The capacity to bear risk is based on your balance sheet. This is the primary reason your lender requires a balance sheet - the need to know if you have adequate equity or net worth to protect yourself against adverse events such as significant yield reductions, should they occur.

By analyzing your cash flow plan and evaluating the impact of a significant yield reduction you can get an assessment of your willingness to accept risk. Changes in cash flows also relate directly back to the balance sheet situation.

Next we'll look at getting a better handle on specifying the risks you face and evaluating the yield guarantees. This will also help you and your lender evaluate your financial statements.

Analyzing Historical Yields

Let's look at the yield situation for a case farm example. The crop under consideration is non-irrigated corn.

The farmer's yields per planted acre may not have met his expectations for the last three years. He realizes that most farmers in the area have had relatively low yields during this period. To get a more realistic yield expectation, he averaged the data he had collected on crop yields for the last eight years. When he looked at this data and thought about the history of yields on his farm, he realized there has been a number of very good years but there also had been a few poor years. Drought reduced yields in some years and hail had reduced yields at least once in the eight year period.

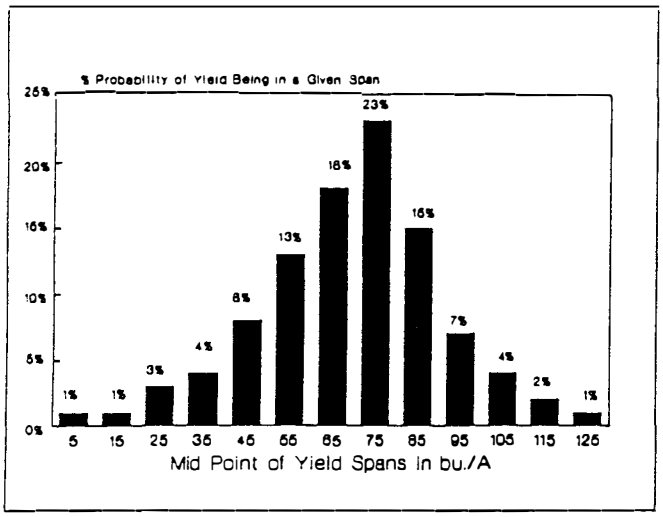

Fig.2 Expected 1988 Yield Probabilities for Corn

Yield Expectations

The farmer then thought about his expectations for the coming year. Figure 2 depicts his estimates of the chances of different corn yield levels for 1988. The heights of the bars for each yield range indicate his expectation of the relative likelihood of that yield occurring. For example, the most likely yield span is 70 to 80 bushels per acre and he thinks there is a 23% chance that his yield will be in that range.

This distribution is an individual's subjective appraisal of yield expectations. It is based on experience, knowledge of current conditions such as soil moisture levels and management ability. The distributions may differ for neighboring farmers due to differences in their management skills. You may, for example, be able to think of farmers in your community with different yield expectations. Two farmers may have similar soil but their yield distributions at both the high and low ends are different due to management practices.

An additional way to look at this information is to consider the chances of a yield below some specified level. This is the concept of cumulative probabilities. The probabilities for each yield range and the cumulative probabilities for the distribution shown in Figure 2 are presented in Table 4. The probability of a yield below 50 bushels per acre is 17%.

This is shown in the third column of Table 4. This can be calculated by adding up the figures in column 3 up to 50 bu. i.e., 1 + 1 + 3 + 4 + 8 = 17. This approach helps identify the chances of a yield less than some critical level such as the yield required to meet cash flow obligations.

You can also use this approach to determine the chances of a yield less than the guarantee such as the 53.3 bu. in the above example. The farmer's estimate, based upon interpolation of the 50-60 bu. range in Table 4, is about 21%.

Steps to Determine Risk Capacity

The capacity to bear risk is based on the ability to maintain financial liquidity and balance sheet equity to stay in business. The first step in determining the capacity to bear risk is understanding the balance sheet. The next step is assessing the impact of risks such as low yields. Knowing the chances of expected yields then provides the basis for assessing the family's capacity to bear yield risks.

Table 4. Expected 1988 Yield Probabilities for Case Farm for Corn

Yield Span	Mid Point of Span	Probability of Yield Span	Cumulative Probability
	---Bu/Ac---	---Percent---	
0-10	5	1%	1%
10-20	15	1%	2%
20-30	25	3%	5%
30-40	35	4%	9%
40-50	45	8%	17%
50-60	55	13%	30%
60-70	65	18%	48%
70-80	75	23%	71%
80-90	85	15%	86%
90-100	95	7%	93%
100-110	105	4%	97%
110-120	115	2%	99%
120-130	125	1%	100%

Two worksheets have been developed to take you through the process of assessing your yield risks. The first worksheet helps you identify and quantify your downside yield risks. The second worksheet helps you project your net cash flow with and without MPCI coverage for alternative yields, including a typical year scenario and a low yield year scenario. It also permits examination of alternative coverage (deductible) levels.

Downside Yield Risk

Let's look at worksheet 1. We begin by assessing the chances of a loss due to each source of risk. This is done by estimating the number of years out of 25 that you expect a loss to occur. For example, you might think drought will reduce expected yield 4 out of 25.

The next step is to assess the potential severity of the loss. Specifically, what is the extent of loss in the event it occurs? We suggest you use an index of 0 to 100 or a percentage to rate the potential loss where 100 would indicate a complete loss. It would also be helpful to use a range of expectations rather than a single number to estimate your perception of the risks you face. This assessment can be used to compare your risks to the deductible levels in MPCI.

In following through the example in Worksheet 1 we indicated a drought was expected to significantly reduce yield 4 years out of 25. We need to now estimate the extent of loss in those 4 years. Let us say we estimate that to be 20 to 65 percent. This will result in a yield loss of 16 to 53 bushels per acre from the expected yield of 82 bushels per acre (20 percent of 82 = .2 x 82 = 16.4).

It is also important to consider the combined impact of these risks. Individually each unexpected loss may not substantially reduce the yield but more than one unexpected loss may occur in a particular year.

Use worksheet 1 to think of all the loss experiences that have occurred on your farm in recent history. A blank worksheet is included at the end of the publication.

The consideration of historical yields and the assessment of the downside risks helps you determine the risks you face and the alternative yields you might consider in the cash flow analysis.

Cash Flow Projection

The case farm includes 400 acres, 300 of which are cropped.

There are also livestock enterprises which are not included in this crop insurance analysis.

The crop acreage is planted to dryland corn. The farmer participates in the USDA farm program, and the program acreage base is 300 acres. The set aside is 20 percent of the base. That means .2 x 300 = 60 acres will be idle in the Acreage Conservation Reserve (ACR). This leaves 240 acres to be planted.

The farmer is considering the purchase of MPCI. In addition to the cash variable expenses, money is required for the overhead expenses including taxes, capital replacement and family living. The farmer projects his pre-harvest variable expenses at $45.44 per acre. Harvest cash expenses are forecasted at $.45 per bu. for normal yields and $.81 for yields below 40 bu. per acre. The expenses for set aside and fallow acres are projected at $11.00 per acre. The operating expenses are given below:

Operating Expenses	
Dryland Corn preharvest expenses	
$45.44/ac x 240 acres	$10,906
Harvest expenses	
Combining	
$14.50/ac x 240 acres	$3,480
Storage and Hauling and Drying	
$.27/bu x 82 bu/ac x 240 ac	$5,314
Set aside	
$11.00/acre x 60 acres	$660
Total Operating Expenses	$20,360

The other annual cash requirements are as follows:

Annual Fixed Cash Flow Requirements	
Property taxes	$2,000
Machinery loan payment (P & I) plus Farm Insurance	$3,600
Land mortgage payment (P & I)	$6,300
Family living: $20,000 total of which half is allocated to crops	$10,000
Overhead	$1,650
Total Overhead and Fixed Expenses	$23,550

The family living can be considered the contribution to family labor and management. No labor costs were included in the cash operating costs.

The total cash flow requirements for the crop enterprise are summarized below:

Total Operating Expenses	$20,360
Total Fixed Expenses	$23,550
TOTAL CASH REQUIRED	$43,910

WORKSHEET 1

EVALUATION OF SOURCES OF RISKS

Crop: Corn

Source	Chance of Loss No. of Years Out of 25	Extent of Loss Use Index of 0-100 To Specify Range	Comments (e.g., Type of Loss; Experiences You or Your Neighbor Have Had)
1. Drought	4	20-65	Almost complete crop failure in '76
2. Excess Moisture	3	30-40	Ponding Problems severe in '84
3. High temp. at pollination.	3	25-40	Heat reduced yield during July '80
4. Flood	1	50-60	Farm lies on edge of flood plain
5. Wind	1	20-30	High winds occasionally knock down crop
6. Hail	4	30-40	SE ¼ located in a hail 'alley'
7. Frost	2	25-40	Early frost in '81 reduced yield
8. Insects	1	20-40	Corn borers a problem in '79
9. Diseases	1	20-50	Still remember corn blight in early '70s
10. Fire	1	40-70	Hit neighbors farm 2 years ago

Revenues are provided by sales and government payments. For budgeting purposes, a harvest equivalent sale price of $1.50 is used. Total sales on 240 acres of dryland corn are projected at $29,520. Deficiency payments are estimated at $1.21/bu., and are based on a program yield of 60 bu./acre. That is a revenue of $72.60/acre, or $21,780.

Total estimated revenues for expected yields are $29,520 + $21,780 = $51,300. The total cash requirements are $43,910 leaving a difference of $7,390 or $24.63 per acre. This difference can be used for other debt retirement, additional family withdrawals or business growth.

Worksheet 2 provides an organizational framework and step-by-step calculations for cash flow projection under alternative yield scenarios. The objective of cash flow projection is to evaluate the economic implications of the downside risk protection provided by MPCI, and to help you evaluate whether you have adequate cash and credit reserves to meet a cash flow shortfall--should it occur.

The example depicted in Worksheet 2 assumes 65% coverage and a $2.00/bu. indemnity price. The 65% coverage was chosen because it provides protection, with a yield guarantee of 53.3 bu/acre. The $2.00 indemnity price was chosen because it's in the range of the projected net sale price received including deficiency payment. Line 11 includes the cash expenses for the cropped acres and the cash expenses for the fallow and set aside acres allocated on per acres basis to the production acres.

The worksheet shows the net cash flow for the typical year without insurance of $24.63, the same figure calculated above. In the disaster year the net cash flow is -$27.33/acre without insurance. A blank worksheet is provided at the end of this publication.

Comparison of Coverage Levels

The next consideration in the budgeting process is to evaluate the performance of alternative coverage levels, particularly in the shortfalls--should they occur. Which coverage level should you purchase? We begin by calculating the premiums per acre, as depicted in Figure 3. As noted earlier, the premium per acre goes up much more rapidly between 65% and 75% versus 50% and 65% coverage.

Next, the downside risk "protection" provided by MPCI is evaluated. Figures 4, 5, and 6 depict the impacts of the 50%, 65%, and 75% coverage levels respectively, on the downside risk protection provided, and the trade-off between annual premiums per acre and downside protection. The $2.00 price election is used for these comparisons.

Figure 5 depicts the impact of MPCI on net cash flow for alternative corn yields for the 65% coverage level. The 65% coverage level puts a floor under net cash flow at a level that covers cash flow requirements. Note, the difference between the two columns for the typical year (i.e. 82 bu./ac) is the MPCI premium payment per acre.

In comparing Figures 4 and 5, net incomes for yields above 50 bushels (the first two bars on the left of the chart) are similar for the 50% and 65% coverage levels. At low yields the net income is higher for the 65% coverage level than the 50% coverage level. For example the net cash flow with insurance at 65% coverage for an 18 bushel yield is $-4.98/acre. Note that the $2.00 price election is used in these calculations.

In previous sections we discussed yield risks and cash flow projections. You also made an assessment of your risk situation. In this section we looked at the protection offered by the three levels of MPCI coverage. Combining all of these allows you to select a strategy that fits you and your situation.

Analyzing Your Financial Reserves

The final step in the analysis is to develop a risk management plan. The plan should be based on the implications of alternative strategies for the long term financial structure of the business.

Potential risks first become apparent in a cash flow analysis as was demonstrated in Worksheet 2. The calculations showed the impact on cash flow of a low yield. In this case there was a cash flow shortfall of $27.33/acre without crop insurance.

In reviewing risk management strategies, it is helpful to trace the impact of cash flow variations through the balance sheet. The balance sheet shows the value of assets and liabilities with the difference between the two being the net worth or owner's equity in the business[4]. A cash flow shortfall, as

WORKSHEET 2

ANALYSIS OF PER ACRE NET CASH FLOW

Crop: Dryland Corn (for Grain)

Situation: Case Farm for Lake County, South Dakota

	Typical Year		Disaster Year	
	With Insurance	Without Insurance	With Insurance	Without Insurance
Projected Crop Sales and Other Cash Inflows:				
1. Enter yield/planted acre	82	82	40	40
2. Enter expected market price of crop at harvest time	$ 1.50	1.50	1.50	1.50
3. Expected sales: Line 1 x Line 2	$ 123.00	123.00	60.00	60.00
4. Enter other receipts (deficiency pmt., straw, etc)	$ 72.60	72.60	72.60	72.60
5. Total receipts: Line 3 + Line 4	$ 195.60	195.60	132.60	132.60
MPCI Premium				
6. Enter insurance yield	82	xx	82	xx
7. Enter level of coverage (.5, .65, or .75)	.65	xx	.65	xx
8. Enter premium rate for the desired level of coverage	4.3%	xx	4.3%	xx
9. Enter crop price election	$ 2.00	xx	2.00	xx
10. Insurance premium: Line 6 x Line 7 x Line 8 x Line 9	$ 4.58	xx	4.58	xx
Projected Crop Cash Requirements				
11. Enter preharvest cash operating expense	$ 45.44	45.44	45.44	45.44
12. Enter harvest cash expense for yield on line 1	$ 36.64	36.64	25.30	25.30
13. Enter debt service, family living, and other fixed cash requirments.	$ 87.19	89.19	89.19	89.19
14. Total cash requirements: Line 11 + Line 12 + Line 13	$ 170.97	170.97	159.93	159.93
Projected MPCI Payment Received				
15. Enter Line 6 x Line 7	53.3	xx	53.3	xx
16. Enter Line 15 - Line 1 (enter a zero if answer is a negative number)	0	xx	13.3	xx
17. Insurance payment received: Line 16 x Line 9	0	xx	26.6	xx
NET CASH FLOW: Line 5 - Line 10 - Line 14 + Line 17	$ 20.05	24.63	-5.31	-27.33

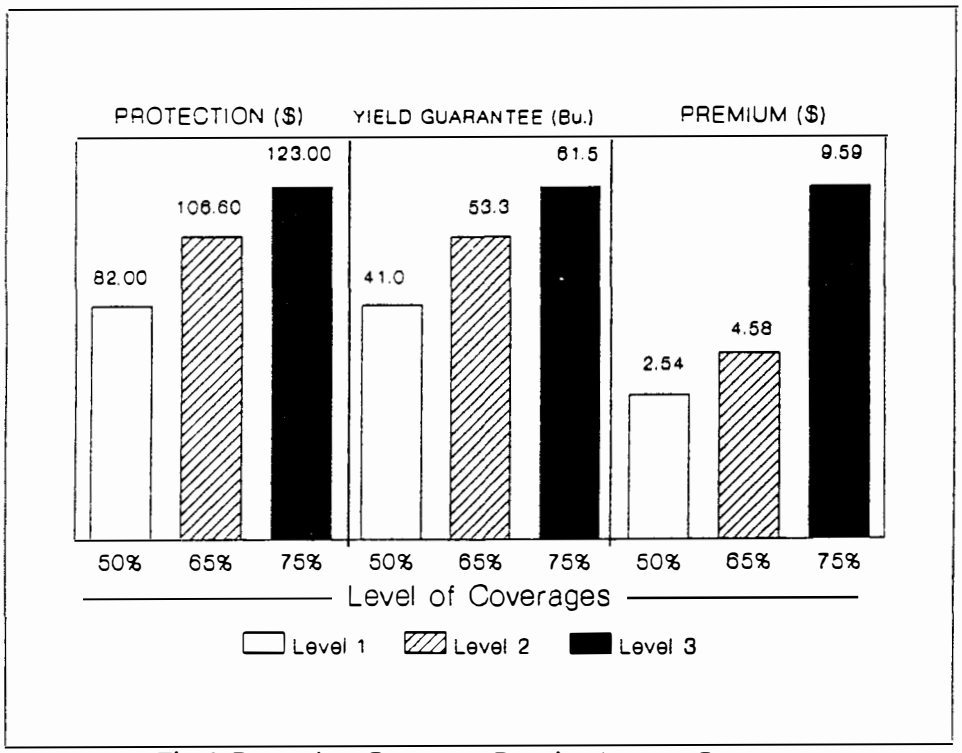

Fig. 3 Protection, Guarantee, Premium/acre vs. Coverage

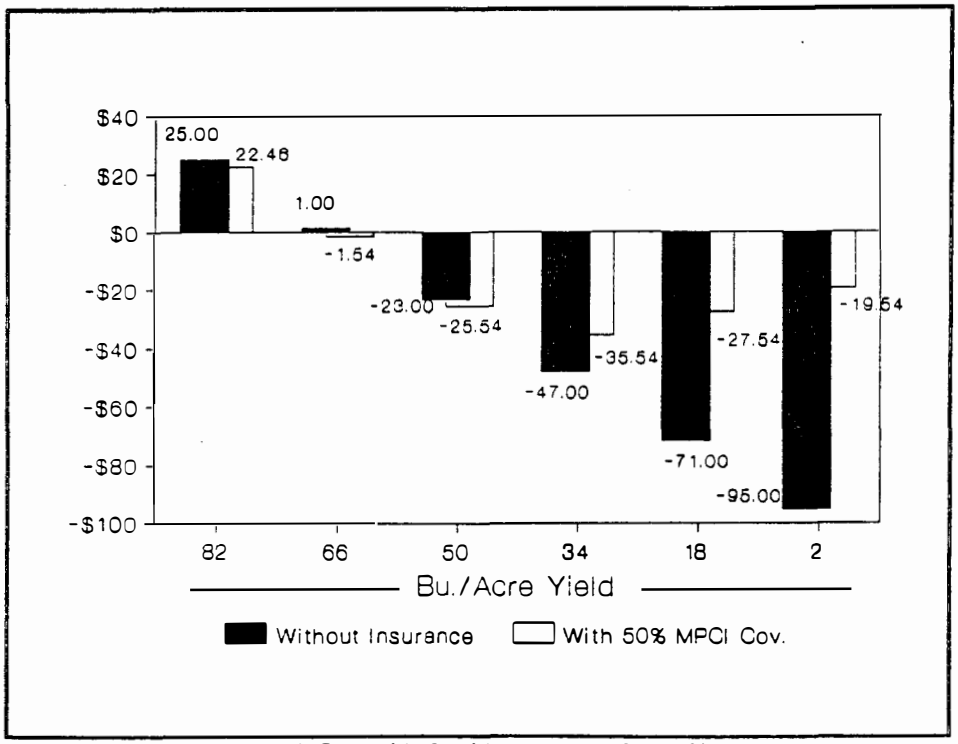

Fig. 4 Net cash flow with & without MPCI for 50% coverage

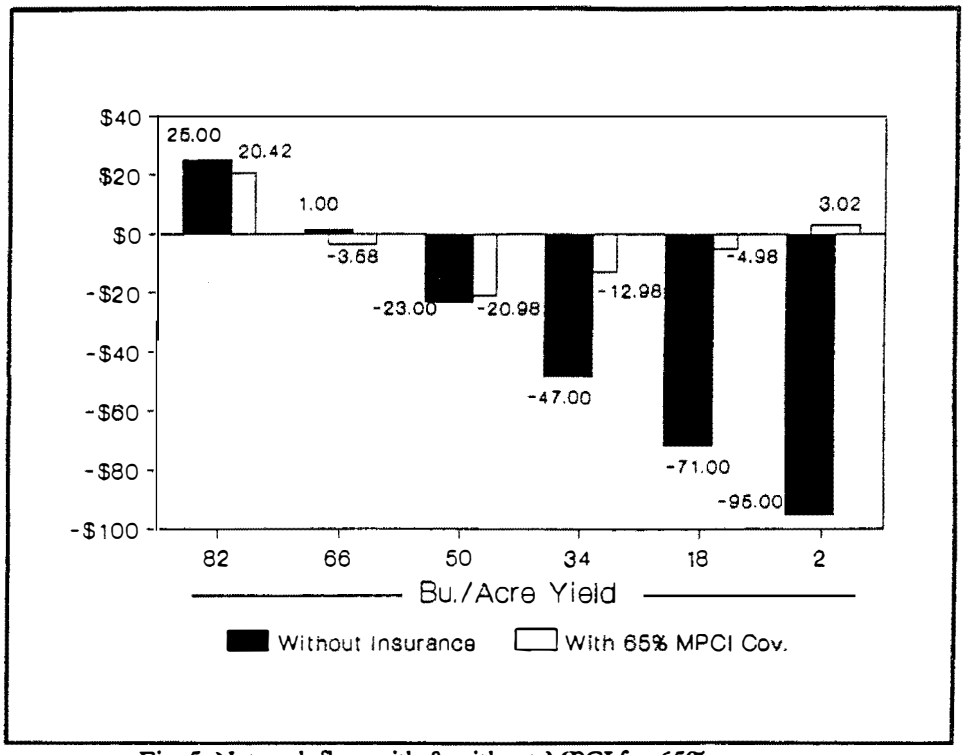

Fig. 5 Net cash flow with & without MPCI for 65% coverage

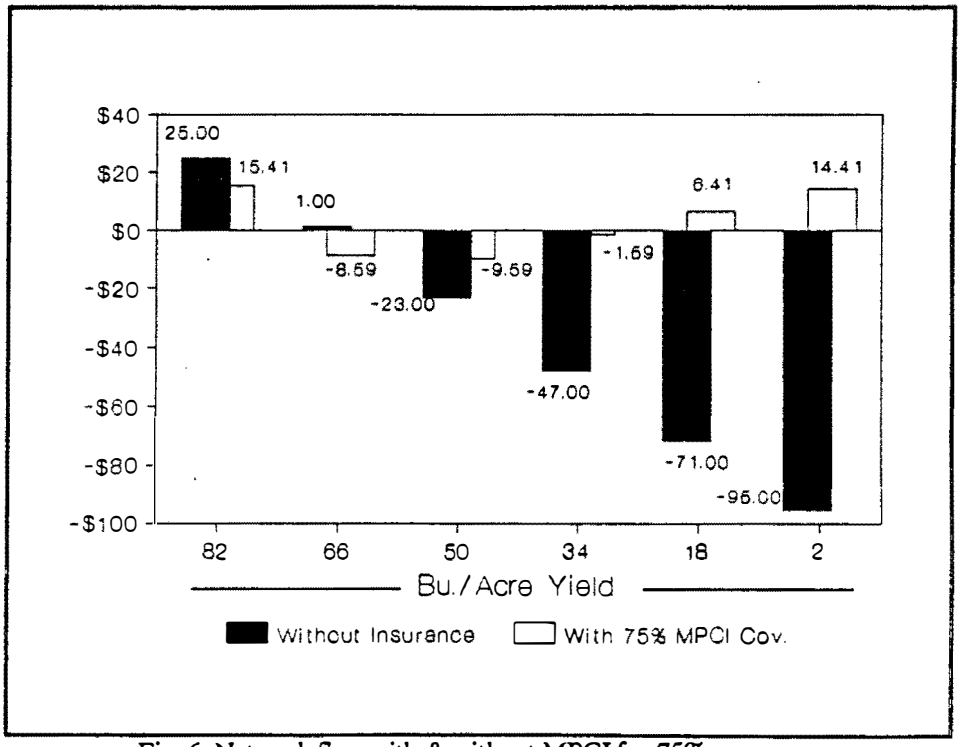

Fig. 6 Net cash flow with & without MPCI for 75% coverage

demonstrated in Worksheet 2, will reduce the equity in the operation. Equity represents the wealth of the owners. It can also be viewed as financial reserves. The question that you need to answer is how much you can allow these reserves to be drawn down to maintain solvency or how much you are willing to let them be reduced.

The implications of reduced yields are influenced by the specific debt level. For instance, for a relatively low debt situation, crop insurance may not be as important as it is for the manager in a relatively high debt situation. However, the low debt manager needs to consider long run implications and the risk strategies that will contribute to achieving the long run goals of the business. The high debt manager definitely needs to consider crop insurance as a tool that can transfer risk and help to keep the farm in business.

Selecting Your Plan

The graphic presentations demonstrate the ability of crop insurance to help stabilize cash flow and provide liquidity in the short run to preserve the long run financial reserves.

In the final analysis the benefits of crop insurance to you depend upon your family's capacity and willingness to take risks and the probability of a loss occurring. Worksheet 1 was designed to help you assess the chances of a loss and Worksheet 2 was designed to help you with the first step in evaluating your capacity to withstand yield losses. You can then apply the results of the cash flow analysis to your specific financial situation by thinking about the implications for your balance sheet.

Credits

[1] Gerald Toland is an Assistant Professor of Economics and Burton Pflueger is an Extension Specialist at South Dakota State University. This publication is adapted from publications prepared by Gayle S. Willett, Washington State University, J. Roy Black and Gerald Schwab, Michigan State University, and from information provided by the Federal Crop Insurance Corporation and the American Association of Crop Insurers, Washington, DC.

[2] Source: The American Association of Crop Insurers, Washington, DC.

[3] Expenditures include seed, fertilizer and lime, herbicides and insecticides, drying, fuel, machinery repairs, custom hire, trucking and interest. The following publication is a useful source of additional information on production costs: Pflueger, Burton, Expected Production Costs for Major Crops in South Dakota, EMC 864, South Dakota Cooperative Extension Service.

[4] For further information on financial planning see: Rieckman, Arnold, et al, Management Guide for Planning a Farm or Ranch Business, EC 744, South Dakota Cooperative Extension Service.