

MULTIPLE PERIL CROP INSURANCE:

What is it? Should you buy it?



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WHAT IS IT?

SHOULD YOU BUY IT?

Allan Lines¹

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 Ohio, as measured by the multiple peril crop insurance claims experience from 1981 to 1987.² How do these patterns compare to your experience?

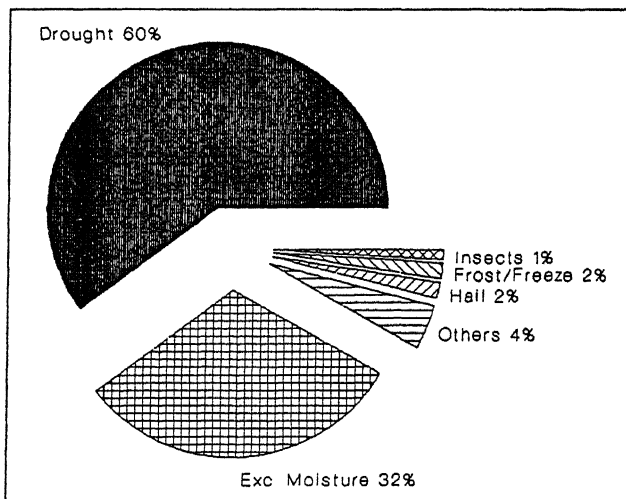


Fig. 1 Why Corn Crops Failed in Ohio 1981-87

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

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; and (2) multiple peril crop insurance (MPCI).

Hail and fire crop insurance (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, under area hail and fire plans, indemnities are paid 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/quality losses, particularly catastrophic losses. You can transfer a portion of your yield risk.
2. It stabilizes your farm's cash flow, thereby making you a lower risk user of borrowed money. 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.

Major factors which influence your MPCCI purchase decision include:

1. Your family's financial capacity to withstand a significant crop yield and/or quality loss; that is, your family's capacity to self-insure.
2. Your family's willingness to take risk; that is, your family's attitude toward risk versus average profit trade-offs.
3. The probability that the yield will fall below your insured coverage.
4. The expected benefits of the insurance due to risk reduction versus the annual premium cost.
5. The purchase of MPCCI may make you eligible 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 MPCCI 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 MPCCI is available in your county you will not be eligible for emergency low-interest loans unless you purchase crop insurance.

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 Ohio.

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 the farmer's yield risks are not specific, the agent would 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 would 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 to both reduce the substantial deductible that is required in MPCCI and expand the range of peril of H/FCI.

What Causes of Yield Losses are Covered?

MPCCI 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

MPCCI 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. For example, in most instances potatoes cannot be insured if potatoes were grown in the previous two years. 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.

TABLE 1.

MULTIPLE PERIL CROP INSURANCE
Programs in Ohio

<u>CODE</u>	<u>COUNTY</u>	<u>WINTER CROPS</u>	<u>SPRING CROPS</u>	<u>CODE</u>	<u>COUNTY</u>	<u>WINTER CROPS</u>	<u>SPRING CROPS</u>
001	Adams	Bly, Wht	Crn, GrS, Oat, Soy, Tob, Tom	093	Lorain	Bly, Wht	Apl, Crn, GrS, Gra, HyS, Oat, Soy, SwC
003	Allan	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy	095	Lucas	Bly, Wht	Crn, DyB, GrS, HyS, Oat, Soy, SuB, SwC, Tom
005	Ashland	Bly, Wht	Crn, GrS, HyS, Oat, Soy	097	Madison	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy, Tom
007	Ashtabula	Bly, Wht	Crn, GrS, Gra, Oat, Soy	099	Mahoning	Bly, Wht	Crn, GrS, Oat, Soy
009	Athens	Bly, Wht	Crn, GrS, *Oat, Soy	101	Marion	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy
011	Auglaize	Bly, Wht	Crn, GrS, HyS, Oat, Soy, Tom	103	Medina	Bly, Wht	Crn, GrS, Oat, Soy
013	Belmont	Bly, Wht	Crn, GrS, Oat	105	Meigs	Bly, Wht	Crn, GrS, *Oat, Soy
015	Brown	Bly, Wht	Crn, GrS, *Oat, Soy, Tob	107	Mercer	Bly, Wht	Crn, GrS, HyS, Oat, Soy
017	Butler	Bly, Wht	Crn, GrS, HyS, Oat, Soy	109	Miami	Bly, Wht	Crn, GrS, HyS, Oat, Soy, Tob
019	Carroll	Bly, Wht	Crn, GrS, Oat, Soy	111	Monroe	Bly, Wht	Crn, GrS, Oat, Soy
021	Champaign	Bly, Wht	Crn, GrS, HyS, Oat, Soy	113	Montgomery	Bly, Wht	Crn, GrS, HyS, *Oat, Pop, Soy, Tob
023	Clark	Bly, Wht	Crn, GrS, *Oat, Soy, Tob	115	Morgan	Bly, Wht	Crn, GrS, *Oat, Soy
025	Clermont	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Tom, Soy	117	Morrow	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy
027	Clinton	Bly, Wht	Apl, Crn, GrS, Oat, Soy	119	Muskingum	Bly, Wht	Crn, GrS, Oat, Soy
029	Columbiana	Bly, Wht	Crn, GrS, Oat, Soy	121	Noble	Bly, Wht	Crn, GrS, *Oat
031	Coshocton	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy	123	Ottawa	Bly, Wht	Crn, GrS, Gra, HyS, Oat, Soy, SuB, Tom
033	Crawford	Bly, Wht	Crn, GrS, *Oat, Soy	125	Paulding	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy
035	Cuyahoga	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy, Tob, Tom	127	Perry	Bly, Wht	Crn, GrS, Oat, Soy
037	Darke	Bly, Wht	Crn, GrS, HyS, Oat, Soy	129	Pickaway	Bly, Wht	Crn, GrS, HyS, *Oat, Pop, Soy, Tom
039	Defiance	Bly, Wht	Crn, GrS, Oat, Pop, Soy, Soy, SwC	131	Pike	Bly, Wht	Crn, GrS, *Oat, Soy, Tob
041	Delaware	Bly, Wht	Apl, Crn, GrS, Oat, Pop, Soy	133	Portage	Bly, Wht	Crn, GrS, Oat, Pop, Soy
043	Erie	Bly, Wht	Crn, GrS, HyS, Pop, Soy	135	Preble	Bly, Wht	Crn, GrS, HyS, Oat, Soy, Tob
045	Farfield	Bly, Wht	Crn, GrS, HyS, *Oat, Soy, Tom	137	Putman	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy, SuB, Tom
047	Fayette	Bly, Wht	Crn, DyB, GrS, HyS, Oat, Soy, Tom	139	Richland	Bly, Wht	Crn, GrS, *Oat, Soy, HyS
049	Franklin	Bly, Wht	Crn, GrS, *Oat, Soy, Tob	141	Ross	Bly, Wht	Crn, GrS, *Oat, Soy, Tob
051	Fulton	Bly, Wht	Crn, GrS, Oat, Soy	143	Sandusky	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy, SuB, Tom
053	Gallia	Bly, Wht	Crn, GrS, HyS, *Oat, Soy, Tom	145	Scioto	Bly, Wht	Crn, GrS, *Oat, Soy, Tob
055	Geauga	Bly, Wht	Crn, GrS, *Oat, Soy	147	Seneca	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy, SuB, Tom
057	Greene	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy, Tom	149	Shelby	Bly, Wht	Crn, GrS, HyS, Oat, Soy
059	Guernsey	Bly, Wht	Crn, GrS, *Oat, Soy, Tob	151	Stark	Bly, Wht	Crn, GrS, Oat, Soy
061	Hamilton	Bly, Wht	Crn, GrS, HyS, Pop, Pot, Soy, SuB, Tom, OAT	153	Summit	Bly, Wht	Crn, GrS, Oat, Soy
063	Hancock	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy	155	Trumbull	Bly, Wht	Crn, GrS, Oat, Soy
065	Hardin	Bly, Wht	Crn, DyB, GrS, HyS, Oat, Pop, Soy, SuB, Tom	157	Tuscarawas	Bly, Wht	Crn, GrS, Oat, Soy
067	Harrison	Bly, Wht	Crn, GrS, *Oat, Soy, Tob	159	Union	Bly, Wht	Crn, GrS, HyS, Oat, Soy
069	Henry	Bly, Wht	Crn, GrS, Oat, Soy	161	Van Wert	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy
071	Highland	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy	163	Vinton	Bly, Wht	Crn, GrS, *Oat, Soy
073	Hocking	Bly, Wht	Crn, GrS, *Oat, Soy, Tob	165	Warren	Bly, Wht	Crn, GrS, HyS, Oat, Soy, Tob
075	Holmes	Bly, Wht	Crn, GrS, Oat, Soy	167	Washington	Bly, Wht	Crn, GrS, *Oat, Soy
077	Huron	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy	169	Wayne	Bly, Wht	Crn, GrS, Oat, Soy
079	Jackson	Bly, Wht	Crn, GrS, *Oat, Soy, Tob	171	Williams	Bly, Wht	Crn, GrS, HyS, Oat, Soy
081	Jefferson	Bly, Wht	Crn, GrS, Oat, Soy	173	Wood	Bly, Wht	Crn, DyB, GrS, HyS, Oat, Pop, Soy, SuB, Tom
083	Knox	Bly, Wht	Crn, GrS, HyS, Oat, Soy	175	Wyandot	Bly, Wht	Crn, GrS, HyS, Oat, Pop, Soy
085	Lake	Bly, Wht	Crn, GrS, Gra, *Oat, Soy				
087	Lawrence	Bly, Wht	Crn, GrS, *Oat, Soy, Tob				
089	Licking	Bly, Wht	Apl, Crn, GrS, HyS, Oat, Pop, Soy				
091	Logan	Bly, Wht	Crn, GrS, HyS, Oat, Soy				

KEY TO ABBREVIATIONS

Apl/Apples, Bly/Barley, Crn/Corn, DyB/Dry Beans, GrS/Grain Sorghum, Gra/Grapes, HyS/Hybrid Seed, Oat/Oats, Pop/Popcorn, Soy/Soybeans, Sub/Sugar Beets, SwC/Sweet Corn, Tob/Tobacco, Tom/Tomatoes, Wht/Wheat

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 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. 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.

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

1. 75% of your insurance yield (i.e., 25% deductible)
2. 65% of your insurance yield (i.e., 35% deductible)
3. 50% of 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 corn as an example and assume your insurance yield is 120 bushels per planted acre. If you purchase 65% coverage (35% deductible), your yield guarantee would be:

120 bushels per acre x 0.65 = 78 bushels/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. See a qualified insurance agent for indemnity price elections.

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.

For example, suppose you have a devastating drought of the kind that happens, on the average, once in two generations. If corn yields on your farm dropped to 40 bu/planted acre, your indemnity payment would be:

(78 bu/acre yield guarantee - 40 bu/acre realized yield) x \$2.00/bu indemnity price = \$76.00/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 2, for example depicts the premium rate structure for corn in a typical Ohio county.

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 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 which decreases the effective subsidy rate. 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/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 78 bu./acre, an indemnity price of \$2.00/bu. and a premium rate of 1.6% the premium is:

78 bu./acre x \$2.00/bu. x 0.016 = \$2.50/acre

The 1.6% premium rate is based upon 65% coverage and the rate table depicted in Table 2.

Table 2 Multiple Peril Crop Insurance County Coverage and Rate Table

State: Ohio	County: Example County	
Crop: Corn	Practice:	
Approved Insurance Yield	Subsidized Premium Rates	
	With Hail and Fire Protection	Without Hail and Fire Protection
COVERAGE LEVEL 1 (50%)		
54 & Below	3.0	2.5
55-69	2.5	2.2
70-85	1.9	1.6
86-100	1.5	1.3
101-116	1.3	1.1
117-131	1.1	0.8
132-147	1.1	0.8
148-162	0.9	0.6
163 & Above	0.9	0.6
COVERAGE LEVEL 2 (65%)		
54 & Below	4.1	3.5
55-69	3.4	2.9
70-85	2.7	2.2
86-100	2.2	1.8
101-116	1.8	1.5
117-131	1.6	1.3
132-147	1.4	1.1
148-162	1.3	1.0
163 & Above	1.3	1.0
COVERAGE LEVEL 3 (75%)		
54 & Below	7.6	6.4
55-69	6.3	5.4
70-85	4.8	4.1
86-100	3.9	3.3
101-116	3.3	2.8
117-131	2.9	2.5
132-147	2.6	2.2
148-162	2.3	2.0
163 & Above	2.2	1.9

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

Do I Have To Insure All of My Crop?

If you purchase MPCCI 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. Each crop is insured separately, so you may insure one crop without having to insure a second crop produced in the same county.

The farm unit is the key concept used by the insurance industry. 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. A qualified crop insurance agent can define the insurable units for the land you farm.

When Must MPCCI Be Purchased?

MPCCI must be purchased by the date specified. In Ohio the closing date for winter crops is September 30 and for spring crops it is April 15.

Hail & Fire Coverage

In contrast to MPCCI, H/FCI provides acre by acre coverage for a given crop with protection up to the "Actual Cash Value" of the crop (120 bu. of corn x \$1.70 = \$204 Actual Cash Value). This protection can usually be purchased anytime during the growing season with a 24-48 hour delay of insurance going into effect.

Should You Purchase MPCCI?

We previously discussed the considerations in the decision process. They include: (1) financial capacity to bear risk, (2) the willingness to bear risk, (3) the effectiveness of the yield guarantee and (4) expected benefits vs. premium costs. In this section we develop budgeting procedures to help you evaluate these factors for your farm.

Your 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 net worth to protect yourself against adverse events such as significant yield reductions, should they occur.

By analyzing the projected case flow plan -- with and without MPCCI -- associated with alternative yield scenarios, you can assess your family's capacity and willingness to accept risk. How much variability in your net cash flow are you willing to accept? The insurance industry uses the concept of peace of mind to describe the consequence of strategies which reduce downside risk.

Analyzing Historical Yields

Next, let's get a better handle on the risks you face. Let's start by looking at the yield situation for a case farm example. The crop under consideration is corn.

The farmer's yields per planted acre have exceeded his expectations for the last two years. However he realizes that most farmers in the area have had relatively high yields during this period. To get a more realistic yield expectation, he averaged the data he had collected on crop yields for the last ten years. When he looked at this data he realized there has been a number of good years and a very poor year. Drought reduced yields in 1980 and 1983.

The family believes they must be able to handle a yield of as low as 40 bu./acre once in every generation. They believe there is an outside chance of a yield as low as 20 bushels once in every two or three generations.

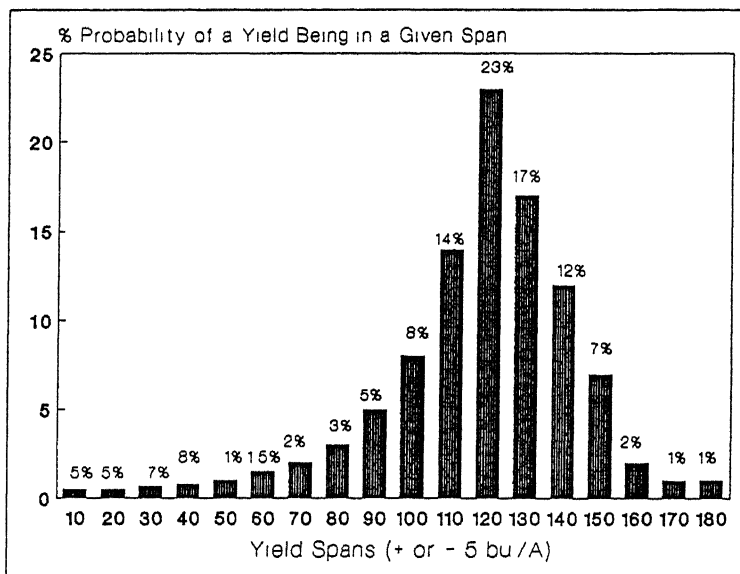
What's the Probability (Chances) of Alternative Yields?

The farmer thought about his expectations for the coming year and they are depicted in Figure 2. The heights of the bars for each yield span indicate his estimate of the relative "likelihood" of a yield occurring in the yield span.

The farmer's estimate of his most likely yield span is 115 to 125 bu./acre. He thinks there is a 23% chance that the yield will be in the span.

The lowest yield span is 5-15 bu./acre, while the highest span is 175-185 bu./acre. Yield fluctuations on the downside, below the most likely yield span, tend to be more extreme than fluctuations on the upside. How does Figure 2 compare to your experience?

Figure 2 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 - both in "most likely" span and the range between the lowest and highest span - for neighboring farmers due to differences in their soils and management skills.



A crucial 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 span shown in Figure 2 and the cumulative probabilities are presented in Table 3.

Let's consider an example. Often, that's the best way to explain a concept. Suppose someone were to ask you about the "effectiveness" of 65% coverage. We know that for many crops, 65% coverage is adequate

Table 3.
Yield Probabilities for Case Farm for Corn to be Harvested in 1988

Yield Range	Mid-Point of Yield Span	Probability of Yield Range	Cumulative Probability
-----Percent-----			
5-15	10.0	0.5	0.5
15-25	20.0	0.5	1.0
25-35	30.0	0.7	1.7
35-45	40.0	0.8	2.5
45-55	50.0	1.0	3.5
55-65	60.0	1.5	5.0
65-75	70.0	2.0	7.0
75-85	80.0	3.0	10.0
85-95	90.0	5.0	15.0
95-105	100.0	8.0	23.0
105-115	110.0	14.0	37.0
115-125	120.0	23.0	60.0
125-135	130.0	17.0	77.0
135-145	140.0	12.0	89.0
145-155	150.0	7.0	96.0
155-165	160.0	2.0	98.0
165-175	170.0	1.0	99.0
175-185	180.0	1.0	100.0

to guarantee that cash variable costs will be met. But what's the probability of a yield being less than 65% coverage -- 78 bu./acre for our case farm?

We simply add up the probabilities of each yield span up to the yield we're discussing. That's 0.5% for the 5-15 bu. span plus 0.5% for the 15-25 bu. span plus .7% for the 25-35 bu. span plus...2.0% for the 65-75 bu. span. That totals to 7.0%.

Since 78 bu. is in the next yield span, we can say there is a bit more than 7 percent, a 1 out of 14 chance, that the farmer's corn yields won't cover variable cost.

This approach helps identify the chances of a yield less than some critical level such as a yield required to meet cash flow obligations.

Determining Risk Bearing Capacity

Your capacity to bear risk is based on your ability to maintain both financial liquidity and balance sheet equity necessary to stay in business. You must assess the impact of risks, such as low yields, on

cash flow and on the resulting changes in your balance sheet. Knowing the chances of obtaining alternative yields provides a basis for assessing your capacity to bear yield risks.

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

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	<u>5</u>	<u>20-40</u>	<u>Primarily north part</u>
2. Excess Moisture	<u>3</u>	<u>5 to 15</u>	<u>Small ponds</u>
3. High temp. at pollination.	<u>3</u>	<u>20 to 15</u>	<u>use different</u>
4. Flood	<u> </u>	<u> </u>	<u>maturity varieties</u>
5. Wind	<u>4</u>	<u>5 to 15</u>	<u>not likely</u>
6. Hai l	<u>6</u>	<u>5 to 15</u>	<u>Excessive harvest loss</u>
7. Frost	<u>2</u>	<u>10 to 20</u>	<u>Only severe in spots</u>
8. Insects	<u>2</u>	<u>5 to 10</u>	<u>Only low part of farm</u>
9. Diseases	<u>2</u>	<u>5 to 20</u>	<u>Comborencausal lodging</u>
10. Fire	<u> </u>	<u> </u>	<u>Blight 1 year</u>

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 5 out of 25 years.

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.

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 560 acres of which 500 acres is cropped.

The farmer plans to participate in the USDA's feed grain program. It is assumed the acreage base for the program is 500 acres. The set aside is 20 percent of the base. That means $.2 \times 500 = 100$ acres will be idle in the Acreage Conservation Reserve (ACR). This leaves 400 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 cash expenses at \$85 per acre and harvest cash expenses at \$12 per acre plus, \$0.15 or 15 cents per bushel. The expenses for set aside acres are projected at \$12.00 per acre. The operating expenses are given below.

Operating Expenses

Corn preharvest expenses	
\$85.00/ac x 400 acres	\$34,000
Harvest expenses	
\$12.00/ac x 400 acres	4,800
plus \$.15/bu x 120 bu/ac x 400 ac	7,200
Set aside \$12.00/ac x 100 acres	<u>1,200</u>
Total Operating Expenses	\$47,200

The other annual cash requirements are as follows:

Annual Fixed Cash Flow Requirement

Property taxes	\$6,000
Machinery loan payment (P & I)	8,100
Land mortgage payment (P & I)	12,500
Family living: \$20,000 total	20,000
Farm insurance and other fixed cash requirements	<u>4,400</u>
Total Overhead and Fixed Expenses	\$56,000

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	\$47,200
Total Fixed Expenses	\$56,000
TOTAL CASH REQUIRED	\$103,200

Revenues are provided by sales and government payments. For budgeting purposes, a harvest equivalent sale price of loan of \$1.50 is used. That is \$1.74/bu. loan price less \$.24/bu. for storage. Total sales on 400 acres of corn are projected at \$72,000. Deficiency payments are estimated at \$1.00/bu., and are based on a program base yield of 110 bu./acre. That is a revenue of \$44,000.

Total estimated revenues for expected yields are $\$72,000 + \$44,000 = \$116,000$. The total cash requirements are \$103,200 leaving a difference of \$12,800 or \$32.00 per planted acre. This difference can be used for other debt retirement, additional family withdrawals or business growth.

Because he has made the decision to be in the feed grain program, he can depend on the deficiency payments regardless of yield. He is also obligated to set aside 100 acres so that all of the cash flow must be generated from the remaining 400 acres of corn.

The farmer has made some financial progress in most years. However, he can remember when yields were below average.

He wonders if he could survive one of those devastating droughts that may happen, on the average, once in every 2 generations. After a recent dry summer, he realizes his yield could drop to 40 bushels or below in an extremely bad year. He wants to see if crop insurance can help him survive such a disaster.

Worksheet 2 provides an organizational framework and step-by-step calculations for cash flow projection under alternative yield scenarios. The objective of the cash flow projection is to evaluate the economic implications of the downside risk protection provided by MPCCI, 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 provides a yield guarantee of 78 bu/acre. Line 11 includes the cash expenses for the cropped acres and the cash expenses for the set aside acres allocated on a per acre basis to the production acres.

The worksheet shows the net cash flow for the typical year without insurance of \$32/acre, the same figure calculated above. In the disaster year the net cash flow is -\$76.00/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 MPCCI 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 MPCCI on net cash flow for alternative yields for the 65% coverage level. The 65% coverage level puts a floor under net cash flow at -\$27.20 per acre at the 78 bu. yield. Note, the difference between the two columns for the typical year is the MPCCI premium payment per acre.

In comparing Figures 4 and 5, net incomes for yields above 60 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 as indicated by the open bars above the \$0 line. For example the net cash flow with insurance at 65% coverage for a 40 bushel yield is -\$2.50/acre. Note that the \$2.00 price election is used in these calculations which is above the \$1.50 market price.

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 MPCCI 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 \$76/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. A cash flow shortfall, as 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.

WORKSHEET 2

ANALYSIS OF PER ACRE NET CASH FLOW

Crop: Corn
 Situation: Ohio Case Farm

10

	Typical Year		Disaster Year	
	With Insurance	Without Insurance	With Insurance	Without Insurance
Projected Crop Sales and Other Cash Inflows:				
1. Enter yield/planted acre	<u>120</u>	<u>120</u>	<u>40</u>	<u>40</u>
2. Enter expected market price of crop at harvest time	\$ <u>1.50</u>	<u>1.50</u>	<u>1.50</u>	<u>1.50</u>
3. Expected sales: Line 1 x Line 2	\$ <u>180</u>	<u>180</u>	<u>60</u>	<u>60</u>
4. Enter other receipts (deficiency pmt., straw, etc)	\$ <u>.10</u>	<u>.10</u>	<u>.10</u>	<u>.10</u>
5. Total receipts: Line 3 + Line 4	\$ <u>290</u>	<u>290</u>	<u>170</u>	<u>170</u>
MPCI Premium				
6. Enter insurance yield	<u>120</u>	<u>XXX</u>	<u>120</u>	<u>XXX</u>
7. Enter level of coverage (.5, .65, or .75)	<u>.65</u>	<u>XXX</u>	<u>.65</u>	<u>XXX</u>
8. Enter premium rate for the desired level of coverage	<u>.016</u>	<u>XXX</u>	<u>.016</u>	<u>XXX</u>
9. Enter crop price election	\$ <u>2.00</u>	<u>XXX</u>	<u>2.00</u>	<u>XXX</u>
10. Insurance premium: Line 6 x Line 7 x Line 8 x Line 9	\$ <u>2.50</u>	<u>XXX</u>	<u>2.50</u>	<u>XXX</u>
Projected Crop Cash Requirements				
11. Enter preharvest cash operating expense	\$ <u>88</u>	<u>88</u>	<u>88</u>	<u>88</u>
12. Enter harvest cash expense for yield on line 1	\$ <u>30</u>	<u>30</u>	<u>18</u>	<u>18</u>
13. Enter debt service, family living, and other fixed cash requirements.	\$ <u>140</u>	<u>140</u>	<u>140</u>	<u>140</u>
14. Total cash requirements: Line 11 + Line 12 + Line 13	\$ <u>258</u>	<u>258</u>	<u>246</u>	<u>246</u>
Projected MPCI Payment Received				
15. Enter Line 6 x Line 7	<u>78</u>	<u>XXX</u>	<u>78</u>	<u>XXX</u>
16. Enter Line 15 - Line 1 (enter a zero if answer is a negative number)	<u>0</u>	<u>XXX</u>	<u>38</u>	<u>XXX</u>
17. Insurance payment received: Line 16 x Line 9	<u>0</u>	<u>XXX</u>	<u>70</u>	<u>XXX</u>
NET CASH FLOW: Line 5 - Line 10 - Line 14 + Line 17	\$ <u>29.50</u>	<u>32.00</u>	<u>-2.50</u>	<u>-76.00</u>

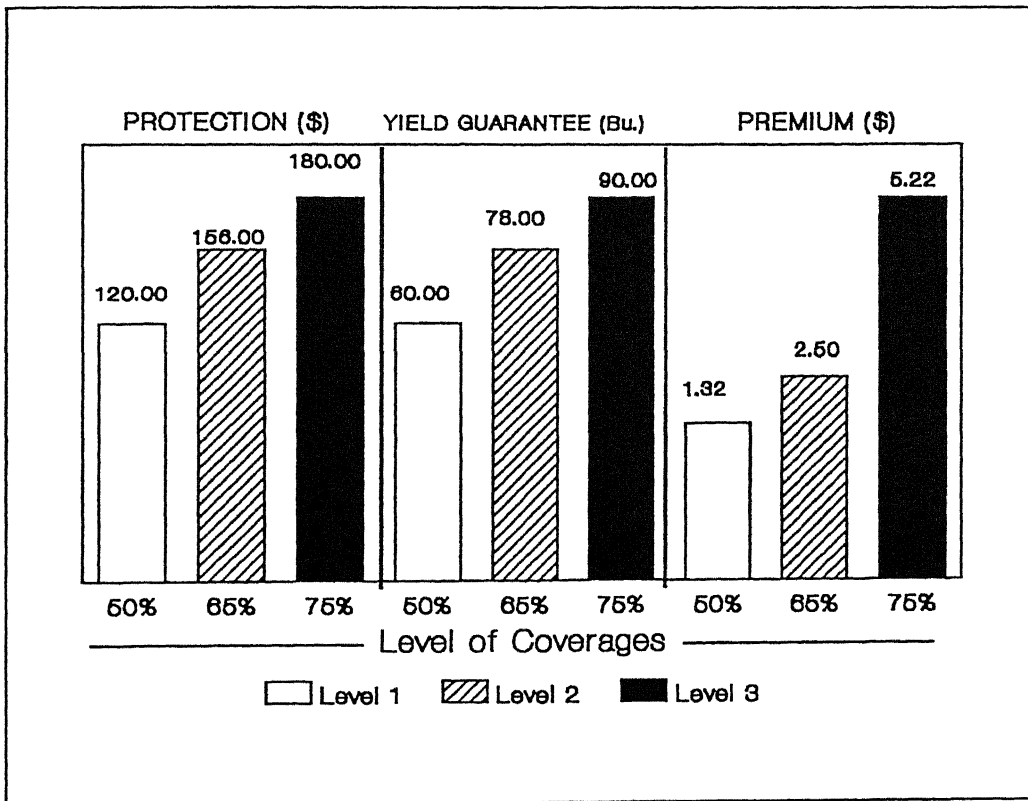


Fig. 3 Protection, Guarantee, Premium/acre vs. Coverage

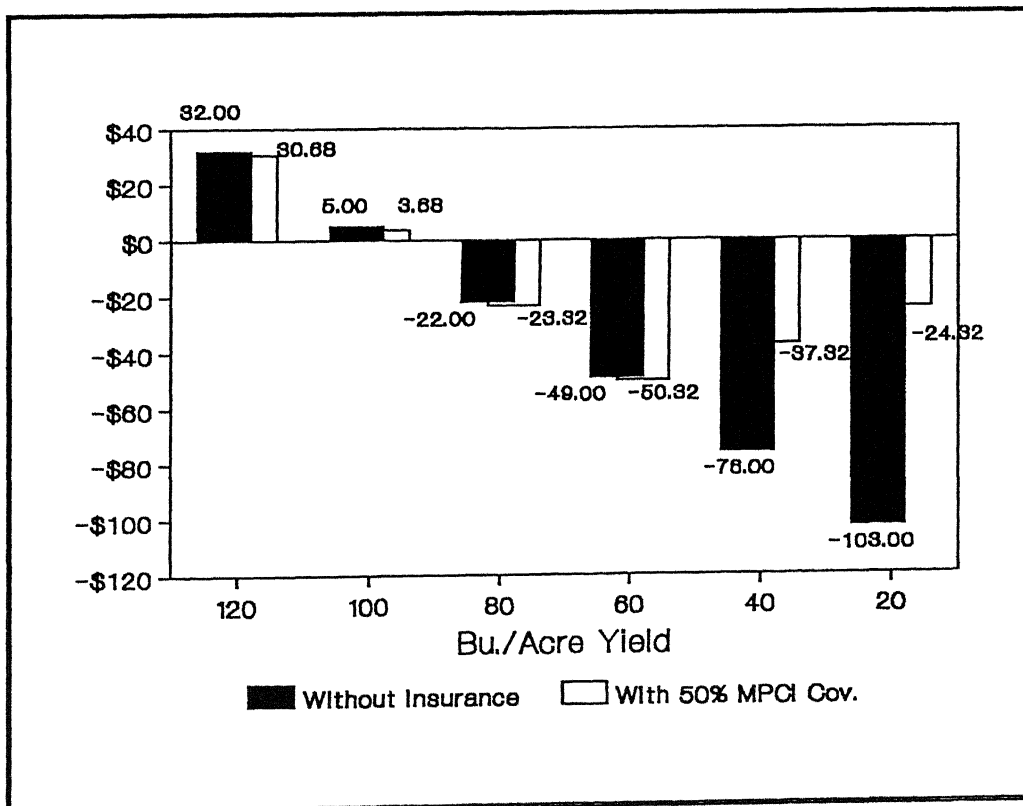


Fig. 4 Net cash flow with & without MPC for 50% coverage

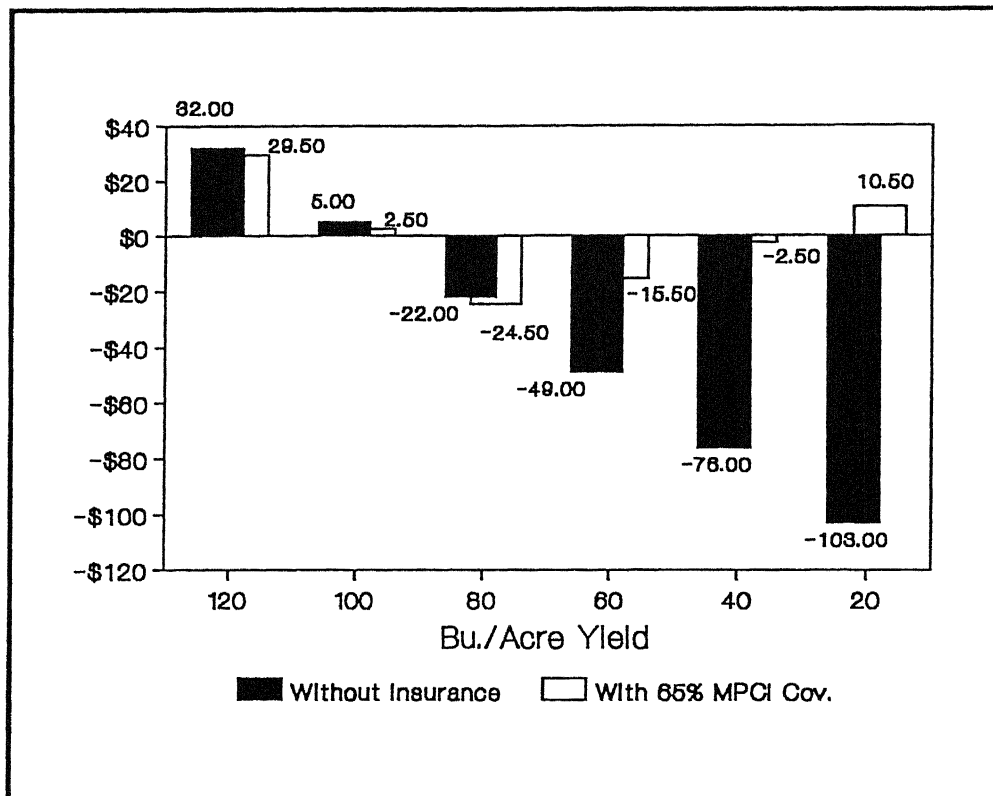


Fig. 5 Net cash flow with & without MPC for 65% coverage

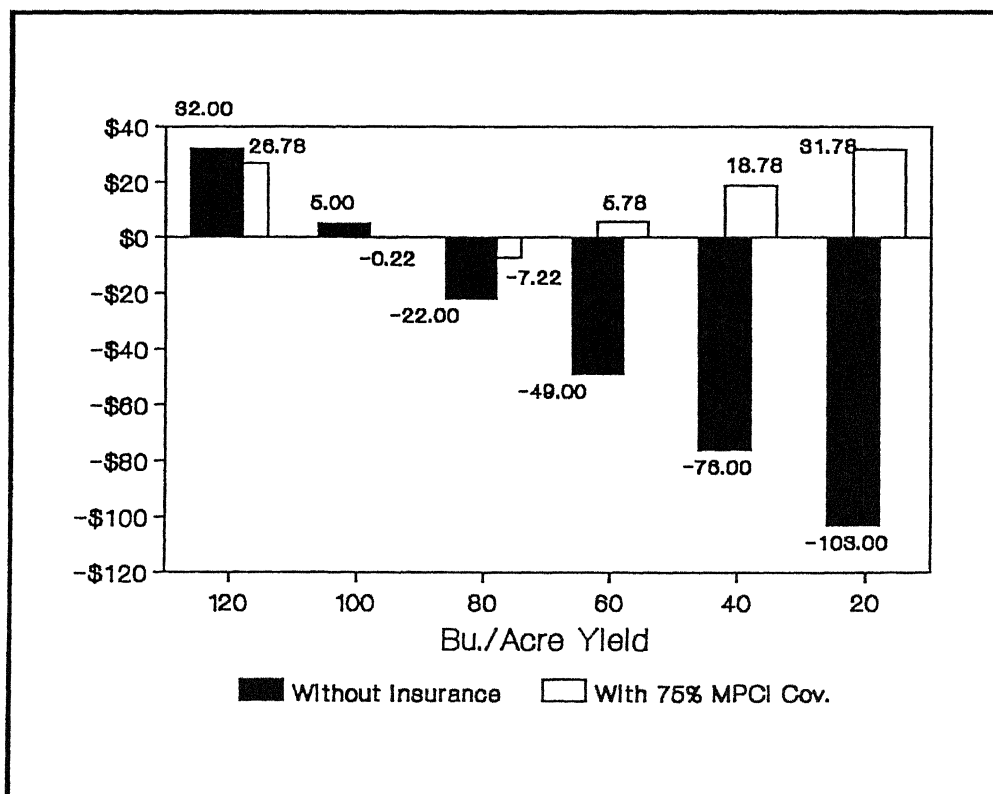


Fig. 6 Net cash flow with & without MPC for 75% coverage

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.

Our case farmer considers the effect of a disastrous year on his net worth. If a devastating drought should come this year his cash flow would be reduced to - \$76 per acre without insurance. This would be a negative \$30,400 cash flow for the farm. His liabilities would increase because he could not make the payments and his net worth would be substantially reduced because of the disaster years. He might also find it difficult to obtain an operating loan for the following year. However, if he insures his corn crop at the \$2.00 per bushel option and the 65% level, he can cut his losses to \$2.50 per acre or \$1,000.

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 Allan E. Lines is an Extension Specialist in Farm Management, at The Ohio State University. This publication is adapted from publications prepared by H. Doug Jose, University of Nebraska, 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.

WORKSHEET 1

EVALUATION OF SOURCES OF RISKS

Crop: _____

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	_____	_____	_____
2. Excess Moisture	_____	_____	_____
3. High temp. at pollination.	_____	_____	_____
4. Flood	_____	_____	_____
5. Wind	_____	_____	_____
6. Hai l	_____	_____	_____
7. Frost	_____	_____	_____
8. Insects	_____	_____	_____
9. Diseases	_____	_____	_____
10. Fire	_____	_____	_____

WORKSHEET 2

ANALYSIS OF PER ACRE NET CASH FLOW

Crop: _____

Situation: _____

	<u>Typical Year</u>		<u>Disaster Year</u>	
	<u>With Insurance</u>	<u>Without Insurance</u>	<u>With Insurance</u>	<u>Without Insurance</u>
Projected Crop Sales and Other Cash Inflows:				
1. Enter yield/planted acre	_____	_____	_____	_____
2. Enter expected market price of crop at harvest time	\$ _____	_____	_____	_____
3. Expected sales: Line 1 x Line 2	\$ _____	_____	_____	_____
4. Enter other receipts (deficiency pmt., straw, etc)	\$ _____	_____	_____	_____
5. Total receipts: Line 3 + Line 4	\$ _____	_____	_____	_____
MPCI Premium				
6. Enter insurance yield	_____	_____	_____	_____
7. Enter level of coverage (.5, .65, or .75)	_____	_____	_____	_____
8. Enter premium rate for the desired level of coverage	_____	_____	_____	_____
9. Enter crop price election	\$ _____	_____	_____	_____
10. Insurance premium: Line 6 x Line 7 x Line 8 x Line 9	\$ _____	_____	_____	_____
Projected Crop Cash Requirements				
11. Enter preharvest cash operating expense	\$ _____	_____	_____	_____
12. Enter harvest cash expense for yield on line 1	\$ _____	_____	_____	_____
13. Enter debt service, family living, and other fixed cash requirements.	\$ _____	_____	_____	_____
14. Total cash requirements: Line 11 + Line 12 + Line 13	\$ _____	_____	_____	_____
Projected MPCI Payment Received				
15. Enter Line 6 x Line 7	_____	_____	_____	_____
16. Enter Line 15 - Line 1 (enter a zero if answer is a negative number)	_____	_____	_____	_____
17. Insurance payment received: Line 16 x Line 9	_____	_____	_____	_____
NET CASH FLOW: Line 5 - Line 10 - Line 14 + Line 17	\$ _____	_____	_____	_____

