

Individual Crop Insurance: Yield Protection

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Introduction

A producer has many tools available to them to mitigate the potential losses resulting from production risks in the form of lower-than-expected yields at harvest. One way to manage farm-level yield risk is through an individual¹ Yield Protection (YP) crop insurance product. We will explain the design of YP and provide examples of how an indemnity is calculated.

Yield Protection

YP provides protection against production risk only. Coverage is based on a yield guarantee which can be found by multiplying the expected yield and a coverage level to be chosen by a producer. Expected yield is measured by the Actual Production History (APH) which is the average of a producer's yield for a given insured unit across the years for which a producer has approved yields. The minimum amount of recorded annual yields to establish an APH is four consecutive years, and the maximum amount is 10. If four years of annual yield history

is not available, one or more T-yields (i.e. Transition Yields), will be substituted into the yield history. A T-yield is the county average of the farm yields for insured producers in a given county and year. YP has eight coverage level options², which range from 50-85% in 5% increments.

YP is designed to pay in bushels if a yield loss is triggered. However, since insurance companies do not hold grain on hand to deliver as payment, the yield loss measured in bushels per acre is multiplied by a futures price to convert the loss to a dollar amount. This futures price is called the Projected Price by USDA-RMA and is the 30-day average of the harvest month futures contract for a given crop and county. Importantly, the period for this 30-day average varies across counties

¹ See Biram and Connor (2023) for a discussion of individual versus area plans of insurance.

² In addition to these coverage levels, catastrophic coverage (CAT) is available. The coverage levels listed here are often considered "Buy-Up" coverage levels because these levels buy up beyond CAT. Buy-Up coverage by far dominates the types of coverage in recent years whereas CAT dominated coverage level choices after it was first introduced in the 1994 Federal Crop Insurance Act to provide a way for producers to buy minimal coverage at a fee so they could participate in countercyclical commodity programs offered in Title 1 of the 2002 farm bill.

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with counties further south generally having earlier discovery periods and counties further north having later discovery periods due to differences in regional climate. The Projected Price discovery period for most crops and counties in Arkansas is Jan. 15 through Feb. 14. Winter wheat has a Projected Price discovery period of Aug. 15 through Sept.14.

Yield Protection Insurance Premiums

The premium, or the cost of insurance, for YP varies by county, crop, irrigation practice, unit structure, and coverage level. Generally, irrigated premium rates are lower than nonirrigated premium rates since the yield risk is lower for irrigated crops. Premiums tend to be highest for optional units with relatively lower premiums for basic units and even lower premiums for enterprise units. Premiums also tend to be higher for higher coverage levels with 85% facing the highest premium and 50% facing the lowest among coverage levels available.

Additionally, one important aspect of crop insurance which sets it apart from typical Property and Casualty insurance is that the premium paid by the producer is partially paid for by the U.S. government in the form of a subsidy. A table of coverage levels and their respective subsidy rates, which is the portion of the premium paid for by the government, is given below (Table 1). These subsidy rates are the same across all program crops, which include corn, cotton, rice, soybeans, wheat and others, and are the same across all states, counties, and irrigation practices. Subsidy rates differ across insurable unit³ structures with enterprise units facing the highest subsidy rates across all eight coverage levels. For more information on the federal crop insurance premium subsidy see Biram (2023).

Table 1. Subsidy Rates for Individual Products Administered by USDA-RMA

Coverage Level	Basic & Optional Subsidy	Enterprise Unit Subsidy
50%	67%	80%
55%	64%	80%
60%	64%	80%
65%	59%	80%
70%	59%	80%
75%	55%	77%
80%	48%	68%
85%	38%	53%

Note: Percentages indicate portion of premium paid by the government.

Examples of the Indemnity Calculation and Impacts to Revenue

This section provides scenarios which show how YP indemnities are triggered for an example growing season. We will use corn prices and irrigated yields from the 2023 growing season and provide per acre returns over cost in each scenario. We assume an APH Yield of 230 bu/ac. Projected Prices are from the [USDA-RMA Price Discovery Tool](#), the Spot Price is from [USDA-AMS Arkansas Daily Cash Grain Bids](#) week of August 29, 2023, the producer paid premium for YP is from the [USDA-RMA Cost Estimator](#) and is for Greene County, AR. We choose the Greene County producer premium because it is representative of the average premium rate paid by Arkansas producers. Key parameters⁴ are given below:

- APH Yield = 230 bu/acre
- Projected Price (USDA-RMA) = \$5.94/bu
- Spot Price (USDA-AMS) = \$4.59/bu
- Producer Premium (80% YP, Optional Units) = \$76.00/ac
- Producer Premium (60% YP, Optional Units) = \$32.00/ac

³ For an explanation of insurable unit structures for individual plans of crop insurance, see Biram and Mills (2023).

⁴ For an analysis using a different county, crop, irrigation practice, unit structure, and coverage level, contact Dr. Hunter Biram.

Scenario 1: No Crop Insurance

In this scenario, a producer chooses to take the spot price at the local grain elevator for their corn, and yield came in at 161 bu/ac. If this were the case, revenue would be \$738.99/ac (161 bu/acre X \$4.59/bu).

Scenario 2: 80% YP Crop Insurance

- Based on the parameters above, the actual yield fell to 30% of APH yield.
- Yield Guarantee (APH Yield X 80% Coverage Level) = 184.00 bu/ac
- Realized Yield = 161.00 bu/ac
- Indemnity ((Yield Guarantee - Realized Yield) x Projected Price) = \$136.62/ac
- Producer Premium = \$76.00/ac
- Indemnity net of Premium (Indemnity - Premium) = \$60.62/ac
- Revenue with Net Indemnity = \$799.61/ac

In this scenario, YP at 80% coverage would provide a producer with 8% more revenue compared to the case with no insurance coverage.

Scenario 3: 60% YP Crop Insurance

Under the assumptions made above, the yield guarantee for YP at 60% coverage will be less than the yield guarantee for YP at 80%. However, the premium paid by the producer will be less for YP at 60% coverage relative to YP at 80% coverage. The producer premium for YP at 60% coverage in Greene County, AR is \$32.00/ac.

- Yield Guarantee (APH Yield X 60% Coverage Level) = 138.00 bu/ac
- Realized Yield = 161.00 bu/ac
- Indemnity ((Yield Guarantee - Realized Yield) x Projected Price) = \$0.00/ac
- Producer Premium = \$32.00/ac
- Indemnity net of Premium (Indemnity - Premium) = -\$32.00/ac
- Revenue with Net Indemnity = \$706.99/ac

In this scenario, YP at 60% coverage would not result in an indemnity since the realized yield is greater than the yield guarantee. Further, the producer premium must be paid which results in a 4% drop in revenue compared to Scenario 1. An important point to make here is that crop insurance is a risk transfer and will not always yield an indemnity payment. However, given the subsidized nature of the actuarially fair crop insurance premium, the average indemnity paid over time (e.g., 10 years) will be greater than the producer premium. A producer should consult with their crop insurance agent and observe historical indemnity payments for insurable units on their farm to determine the best coverage level.

Conclusion

YP is an individual crop insurance product which provides protection against yield losses relative to a yield guarantee. This fact sheet provides the basic knowledge needed to make an informed decision to purchase YP crop insurance by explaining the yield guarantee and providing examples of when an indemnity will and will not trigger. Purchasing YP at higher coverage levels provides greater yield risk protection but comes at a higher cost in the producer premium while YP at lower coverage levels provide less yield risk protection and a lower producer premium cost. It is important to consult with your crop insurance agent to determine the best coverage level to fit your crop enterprise budget and risk protection needs.

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