

API Name: Crop Insurance Premium Calculator

API Address: <https://ag-analytics.portal.azure-api.net/docs/services/federal-crop-insurance-quoter/operations/post-request-federal-crop-insurance-quoter>

Request URL: <https://ag-analytics.azure-api.net/FederalCropInsuranceQuoter/post>

Purpose:

To calculate insurance premiums for Yield Protection, Revenue Protection, and Revenue Protection with Harvest Price exclusion, along with their area coverage alternatives.

Request Methods

Request Requirements

Data request format - json string

Format ('key': value data type)

Parameters

'FIPS' : **int**

The FIPS code of a county (e.g. 17019).

'CropCode': **int**

The code for a crop (e.g. corn's crop code is 41) from table A00420 of RMA ADM files.

'Type' : **int**

The code for the type of a crop (e.g. corn type grain is 16) from RMA ADM files.

'Practice': **int**

The code for the practice type of a crop (e.g. non-irrigated is 3) from RMA ADM files.

'PreventedPlanning' : **int**

An integer in the range [0, 2]. 0 = Standard, 1 = Plus 5%, 2 = Plus 1.

'UseTAYield' : **int**

An integer in the range [0, 1]. 1 = Use Trend-Adjusted Yield, 0 = do not use Trend-Adjusted Yield.

'SharePercentage' :	double
A float indicating the insured share percent, in the range [0.001, 1].	
'TrendAdjustedYield' :	double
A double specifying the Trend-Adjusted Yield.	
'Acres' :	double
A double specifying the acreage.	
'Year' :	int
An integer specifying the year that the calculation should take place for.	
'APHYield' :	double
A double specifying the Actual Production History Yield.	
'Price' :	double
A double specifying the projected crop price.	
'Volatility' :	double
A double specifying the volatility of the crop.	
'ReturnParameters' :	int
If value is 1, parameters for the steps of the premium calculation are included in the response. If value is 0, parameters from the premium calculation are not included in the response.	
'HighRiskCode' :	string
Subcounty high risk code that the insured field is located in and is relevant to the specified crop, practice, and type (e.g. 'AAA').	

Response

'Premium' :	double[8 , 9]
The eight arrays are for coverage levels 50% - 85%, index corresponding the ascending coverage. Within each array, index values are as shown:	
double[* , 0] → RP Optional	
double[* , 1] → RP Basic	
double[* , 2] → RP Enterprise	

double[* , 3] → RPHPE Optional

double[* , 4] → RPHPE Basic

double[* , 5] → RPHPE Enterprise

double[* , 6] → YP Optional

double[* , 7] → YP Basic

double[* , 8] → YP Enterprise

'PremiumAllAcres' : **double[8 , 9]**

The premium per acre from the 'Premium' value multiplied by the acreage. Has same index structure as 'Premium'.

'Subsidy' : **double[8 , 2]**

The eight arrays are for coverage levels 50% - 85%, index corresponding the ascending coverage. Within each array, index arrays are as follows:

double[* , 0] → Subsidy rate for Basic/Optional units

double[* , 1] → Subsidy rate for Enterprise units.

'Liability' : **double[8 , 1]**

The eight arrays are for coverage levels 50% - 85%, index corresponding the ascending coverage. Each value is the liability at that coverage level.

'TotalPremium' : **double[8 , 9]**

Same structure as 'Premium'. Values are the premiums before the subtracting the subsidy.

'TotalPremiumAllAcres' : **double[8 , 9]**

The total premium per acre from 'TotalPremium' multiplied by the acreage amount. Has same index structure as 'Premium'.

'SubsidyAmount' : **double[8 , 9]**

Same index structure as 'Premium'. Values are the dollar amount per acre that are subtracted from the 'TotalPremium' to give you the 'Premium'.

'SubsidyAmountAllAcres' : **double[8 , 9]**

The subsidy amount per acre from 'SubsidyAmountAllAcres' multiplied by acreage amount. Has same index structure as 'Premium'.

'Guarantee' : **double[8 , 3]**

The eight arrays are for 50-85% coverage levels with index corresponding to ascending coverage level. The values in each array are as follows:

double[* , 0] → Minimum Revenue Guarantee

double[* , 1] → Revenue guarantee

double[* , 2] → Yield guarantee

'CountyLevelPrem' : **double[5 , 9]**

The five arrays are for coverage levels index corresponding the ascending coverage. The values in each list match the index structure in 'Premium'.

'CountyLevelGuarantee' : **double[5 , 3]**

The five arrays are for coverage levels index corresponding the ascending coverage. The values in each array are as follows:

double[* , 0] → Minimum Revenue Guarantee

double[* , 1] → Revenue guarantee

double[* , 2] → Yield guarantee

'CountyDataAvailable' : **bool**

Indicates whether county level data is available for the input given.

'Plans': **int[]**

Array of unspecified length, indicating what insurance plans are available for the inputs given.

'Parameters: **string**

Array of unspecified length, indicating what insurance plans are available for the inputs given.

Coverage levels (e.g. '50%')

Policy ('rp', 'yp', 'rphpe')

Unit ('Basic', 'Optional', 'Enterprise')

Parameters (Parameters of the equation)

Example API Call

```
https://ag-analytics.org/AgRiskManagement/api/RMARates/CalculateGet?req={'FIPS':17113, 'CropCode':41, 'Type':16, 'Practice':3, 'PreventedPlanting':0, 'UseTAYield':1, 'UsePerAcre':1, 'SharePercentage':1.0, 'TrendAdjustedYield':100, 'Acres':100, 'Year':2014, 'APHYield':100, 'Price':4.62, 'Volatility':0.19, 'ReturnParameters': 1}
```

Details on API Validation Documents

Accompanying this documentation are two additional files.

generateAllPremiums.py

PremCalcResults.csv

PremCalcResults.csv is a file produced by the programmatic calling of Ag-Analytics' crop insurance API. The python script generateAllPremiums.py is the program that makes the API calls.

generateAllPremiums.py

This file uses the ADM files downloaded from the RMA to programmatically generate premium quote request parameters. The full query can be seen in the python script. If running the script, the user will need to sign up for an Ag-Analytics' API account, because the script will exceed the number of queries allow for an unregistered user, ag-analytics.org/AgRiskManagement/Login.

The following parameter combinations are used.

Counties – All counties

Commodities – Corn (41) and Soybeans (81)

Type – For Corn, Grain (16); No Type Specified (997).

For Soybeans, Commodity (91); No Type Specified (997).

Practice – For Corn, Non-Irrigated (3).

For Soybeans, Fac (Non-Irrigated)(OT)(725); Non-Irrigated (3); Fac (Non-Irrigated) (43);

Non-Conventional (Non-Irrigated) (155); Fac (Non-Irrigated)(OC)(726);

Year – 2017

To cover a range of acreage scenarios, a random acreage in the range [100 , 1000] is used for each query.

The APH Yield is set to the T-yield for that year.

Each set of parameters is used to calculate premiums with Trend Adjustment and without Trend adjustment.

When the calculation uses Trend Adjustment, we assume a scenario where the user has 10 years of historical data, and calculate the Rate Yield as $APH\ Yield + (5.5 * Trend\ Adjustment\ Factor)$.

When the calculation does not use Trend Adjustment, we set the Rate Yield equal to the APH Yield.

Projected Price is kept consistent with what is queried from the ADM Files.

Prevented Planting is always set to 0.

Volatility Factor is set to the value queried from the ADM files.

Share Percentage is always set equal to 1.

PremCalcResults.csv

Each row of the results csv is formatted in the order seen below:

Insurance Plan

The insurance plan and unit option for the row.

Insurance Option Code

The code of the insurance plan (e.g. YP is 1).

Unit Option

The unit type of the query.

Year

The year the calculation was calculated for.

FIPS

The county FIPS code used in the query.

CropCode

The commodity for the query.

Acres

The randomly generated acreage amount.

Type

The commodity type used in the equation.

Practice

The practice code used for the query.

Price

The projected price for the query.

APHYield

The Actual Production Historic Yield used in the calculation.

TrendAdjustedYield

The Trend Adjusted Yield (Rate Yield) used in the query.

PreventedPlanting

Prevented Planting option used in the query.

SharePercentage

Share percentage used in the query.

UseTAYield

Indicates if Trend Adjustment was used in the calculation or not.

Volatility

The price volatility factor used in the query.

50 – 85%

The premium (total premium – subsidy amount) for the parameters, for all acres.