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## Calcium and Magnesium Content of Agricultural Liming Materials Sold in Indiana

E. L. Hood

S. J. Ross Jr.

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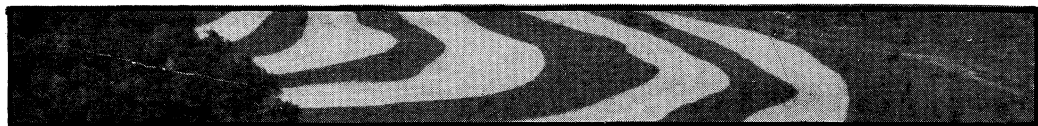
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# AGRONOMY GUIDE



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*L Ross*

## Calcium and Magnesium Content of Agricultural Liming Materials Sold in Indiana

AY-189  
Lime

E. L. Hood and S. J. Ross, Jr., Department of Agronomy

Lime used for agricultural purposes comes in many forms. Agricultural limestone, marl, blast furnace slag, acetylene lime, burnt lime and water softening refuse are just a few of many materials effective in correcting soil acidity.

In Indiana, all but about 10,000 of the 1,800,000 tons of liming materials sold is agricultural limestone. But regardless of the type of lime being used, the customer should always be concerned about its quality.

What is lime quality, and how is it determined? Quality is expressed in terms of (1) the efficiency with which a liming material neutralizes an acid soil, and (2) its ability to supply available calcium (Ca) and magnesium (Mg). In other words, the chemical as well as the physical properties (finesness of grind, particle size, etc.) determine lime quality.

### IMPORTANCE OF KNOWING THE CHEMICAL CONTENT OF LIME

The table at the end of this publication shows the calcium and magnesium content of agricultural liming materials being sold in Indiana. Once a person has determined

the type of lime he needs, he may refer to this table to find the dealer nearest him who can supply that material. The merits of high calcium or high magnesium lime and when to use each is discussed in Purdue Agronomy publication AY-155, Dolomitic or Calcitic Lime, available free to Indiana residents from their local county Extension office.

Where forage crops are produced on low magnesium soils under heavy nitrogen and potassium fertilization, magnesium deficiency is likely to occur. Periodic soil tests for exchangeable Ca and Mg and occasional plant tissue analyses are recommended under these conditions to monitor the soil's magnesium-supplying power and help prevent deficiency problems.

### PROCEDURES USED IN ANALYZING THE LIMING MATERIALS

The liming materials analyzed for this study were official samples collected by the Purdue Soil and Plant Analysis Laboratory for the state Agricultural Stabilization and Conservation Committee. Tests were run on sub-samples gathered at three different times over a 5-month period.

The samples were first digested in hydrochloric acid. Then the acid extract was diluted so that Ca and Mg levels could be determined by atomic absorption spectrophotometry. Finally, the concentrations of the two elements were converted to "carbonate equivalents" and the total neutralizing value (TNV) of each sample calculated.

TNV is a measure of the capacity of a liming material for correcting soil acidity, using 100% pure calcium carbonate as a standard. Since the atomic weight of magnesium is less than that of calcium, a given weight of magnesium carbonate ( $MgCO_3$ ) is 19% more effective than the same amount of calcium carbonate ( $CaCO_3$ ). Total neutralizing value (or calcium carbonate equivalent) is thus determined by the following formula:  
 $TNV = \% CaCO_3 + \% MgCO_3 \times 1.19.$

In general, chemical analyses for a specific liming source should remain relatively

constant, assuming the same rock formations are being quarried. Calcitic limestone will contain high levels of  $CaCO_3$ , whereas dolomitic limestone is characterized by higher levels of  $MgCO_3$ .

#### HOW TO INTERPRET THE TABLE

The liming materials analyzed in the following table are listed by county in which they are sold. This includes some samples crushed outside Indiana. The abbreviation L means limestone; M means marl. Location of source is the town nearest the quarry or pit where the liming materials were sampled. Percent  $CaCO_3$  and percent  $MgCO_3$  contained in the tested material are presented separately, then combined to give the total neutralizing value.

The carbonate figures may be converted into percent calcium or percent magnesium as follows:  
 $\% Ca = \% CaCO_3 \times 0.4;$   
 $\% Mg = \% MgCO_3 \times 0.29.$

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County	Producer and/or Vendor	Location of Source	Type of Material	Percent CaCO <sub>3</sub>	Percent MgCO <sub>3</sub>	Total Neutralizing Value
Adams	John W. Karch Stone Co.	Bryant	L	50.4	46.7	106.1
	Meshberger Brothers	Linn Grove	L	49.6	46.7	105.3
	Rockford Stone Company	Rockford, Ohio	L	52.1	46.7	107.8
Allen	The France Company	Paulding, Ohio	L	89.1	5.4	95.5
	May Stone & Sand, Inc.	Fort Wayne	L	52.1	45.3	105.9
	Midwest Aggregates Corp.	Woodburn	L	68.1	21.5	93.6
	Stone-Street Gravel, Inc.	Poe	L	50.4	39.6	97.3
Bartholomew	Meshberger Stone Company, Inc.	Columbus	L	73.2	22.8	100.2
Blackford	J & K Stone Corp.	Montpelier	L	50.8	45.2	104.5
Carroll	Delphi Limestone Co.	Delphi	L	50.4	42.2	100.4
Cass	Cass County Stone Corp.	Logansport	L	56.3	38.5	102.0
	Engineering Asphalt	Logansport	L	77.3	4.2	82.3
	France Stone Company	Logansport	L	79.0	17.2	99.4
Clark	T. J. Atkins & Co.	Jeffersonville	L	94.2	3.5	98.3
	Sellersburg Stone Company	Sellersburg	L	84.0	6.4	91.6
Crawford	Hy-Rock Products Co.	Marengo	L	84.0	10.3	96.2
	Mulzers Crushed Stone Co.	Eckerty	L	81.6	8.5	91.7
	Mulzers Crushed Stone Co.	Cape Sandy	L	82.4	8.5	92.5
	Mulzers Crushed Stone Co.	Temple	L	86.6	3.5	90.7
Decatur	Harris City Stone Co.	Harris City	L	75.6	14.6	92.9
	New Point Stone Co.	Newpoint	L	63.1	21.2	88.3
Delaware	Irving Brothers Stone & Gravel Co.	Desota	L	45.4	43.5	101.1
	J & K Stone Corp.	Muncie	L	52.1	41.7	101.4
	Muncie Stone & Lime Co.	Muncie	L	48.7	43.2	99.9

County	Producer and/or Vendor	Location of Source	Type of Material	Percent CaCO <sub>3</sub>	Percent MgCO <sub>3</sub>	Total Neutralizing Value
Dubois	Cave Quarries	Paoli	L	82.4	9.1	93.2
Elkhart	Miller Marl Company	Cass Lake	M	89.1	3.1	92.8
	Franklin Mishler	East Lake	M	83.2	3.6	87.5
	James Platz	Tom Corson Farm	M	92.5	1.6	94.4
	Willis Speicher	Cass Lake	M	90.0	3.4	94.0
	Ulmer & Sons	Mud Lake	M	88.3	3.6	92.6
	Marion W. Wolkins	Wolkins Farm	M	88.2	3.7	92.6
Franklin	Allied Chemical Corp.	Miamitown, Ohio	L	56.3	28.6	90.2
Fulton	Wayne Crill	Gagnon Farm	M	88.2	2.7	91.4
	Wayne Crill	Lake Sixteen	M	89.1	2.4	91.9
Grant	Pipe Creek Stone Co.	Mier	L	67.2	13.2	82.8
Harrison	Corydon Crushed Stone & Lime	Corydon	L	91.6	6.3	99.1
	Davis Crushed Stone Co.	Ramsey	L	80.7	6.2	88.1
	Carl Mathes	Corydon	L	85.7	11.4	99.2
	Robertson Crushed Stone	Depauw	L	94.2	0.5	94.8
Howard	Yeoman Stone Co.	Kokomo	L	52.1	37.0	96.1
Huntington	Erie Stone Co.	Huntington	L	48.7	47.5	104.9
	Erie Stone Co.	Markle	L	47.1	43.8	104.9
Jasper	W. C. Babcock Construction	Rensselaer	L	52.1	37.3	96.3
	Northern Indiana Stone, Inc.	Rensselaer	L	48.7	38.8	94.7
Jay	Bakers Rockledge Products Co.	Portland	L	49.6	44.8	106.5
Jennings	Berry Materials Corp.	North Vernon	L	73.9	21.8	99.7

LaGrange	Miller Marl Co.	Near Indiana Lake	M	92.4	2.8	95.7
	Miller Marl Co.	South Side-Cass Lake	M	90.7	3.3	94.6
	Franklin Mishler	East Lake	M	87.4	3.5	91.5
	Willis Speicher	North Side-Cass Lake	M	88.2	3.5	92.3
	Duane Velie	LaGrange	M	88.2	3.6	92.5
Lake	Livingston Stone Co.	Pontiac, Ill.	L	84.1	3.1	87.8
	Manteno Limestone Co.	Manteno, Ill.	L	48.7	47.6	105.0
	Material Service Corp.	Thornton, Ill.	L	47.0	47.6	103.3
LaPorte	Lester Bannwart	Michigan City	M	88.2	2.3	90.9
	B. W. Crosby	Martell-Pit #2	M	89.1	4.1	94.0
	B. W. Crosby	Martell-Pit #3	M	90.0	4.3	95.1
	Frank's Excavating Service	Pit #3	M	85.7	4.3	90.8
	Frank's Excavating Service	Pit #4	M	84.8	4.5	90.3
	Robert Martin	Pit #1	M	91.7	4.2	96.7
	Robert Martin	Pit #2	M	90.0	4.0	94.7
	Robert Martin	Pit #3	M	90.0	4.1	94.9
	Satkoski Brothers	Satkoski Farm	M	87.2	3.2	91.0
	E. M. Ulmer & Sons	South Side-Fish Lake	M	89.1	3.9	93.7
Lawrence	Bedford Ground Limestone Co.	Bedford	L	99.1	0.9	100.1
	Bloomington Crushed Stone Co.	Springville	L	87.2	2.9	90.6
	Mitchell Crushed Stone Co.	Georgia	L	92.4	2.5	95.4
	Oolitic Ground Limestone Co.	Bedford	L	87.2	10.4	99.5
Madison	Concrete Materials Division					
	Martin Marietta Corp.	Lapel	L	55.5	35.0	97.0
Marshall	Charles C. Bailey	Eddy Lake	M	92.4	3.4	96.4
	George Hopple	Maxinkuckee Fish Hatchery	M	89.1	3.7	93.5
	Arthur G. Miller	Miller Farm	M	87.2	2.8	90.5
	Dean Phillips	Pit #3	M	94.1	3.5	98.2
	Dean Phillips	Pit #4	M	90.0	2.9	93.4
	Allen Weaver	Maxinkuckee Fish Hatchery	M	90.7	3.4	94.7
Miami	Gus Doppes	Grissom Air Force Base	WSRL	74.8	5.9	81.7

County	Producer and/or Vendor	Location of Source	Type of Material	Percent CaCO <sub>3</sub>	Percent MgCO <sub>3</sub>	Total Neutralizing Value
Monroe	Bloomington Crushed Stone Co.	Bloomington	L	93.3	1.3	94.8
Morgan	Clayton Winders & Sons	Porters Cave	L	90.0	4.1	94.9
Newton	Newton County Stone Co.	Kentland	L	53.8	37.3	98.0
Noble	Raymond Beezley	Erdly Farm	M	90.7	3.4	94.7
	Raymond Beezley	Fetters Farm	M	85.7	2.3	88.4
	Vernon Kaufman	Fought Pit	M	85.7	2.8	89.0
Orange	Calcar Quarries	Paoli	L	87.3	6.4	94.9
	Cave Quarries, Inc.	Prospect	L	84.1	6.2	91.4
	Radcliff, Inc., "Orleans Quarry"	Orleans	L	92.4	2.2	95.0
Owen	American Aggregates Corp.	Spencer	L	86.5	2.3	89.2
	Clayton Winders & Sons	Spencer	L	84.0	4.5	91.3
Perry	Mulzers Crushed Stone Co.	Derby	L	80.6	7.5	89.5
Pulaski	Western Indiana Aggregates	Francesville	L	55.4	43.2	106.6
Putnam	Ohio & Indiana Stone Co.	Detro Yard	L	85.7	1.6	87.6
	Ohio & Indiana Stone Co.	Greencastle	L	86.5	0.7	87.3
	Russellville Stone Co.	Russellville	L	79.8	5.7	86.6
	Concrete Materials Division	Stilesville	L	80.7	10.5	93.1
	Martin-Marietta Corp.	Manhattan	L	90.8	2.9	94.2
	Standard Materials Corp.	Cloverdale	L	86.6	7.0	94.9
	Ohio & Indiana Stone Co.	Cloverdale	L	72.3	18.5	94.2
Randolph	Bakers Rockledge Products, Inc.	Fairview	L	53.8	43.2	105.0
	H & R Stone Co. (Div. DeBolt Concrete Co.)	Ridgeville	L	49.8	47.1	105.6

Ripley	Berry Materials Corp.	Versailles	L	58.8	35.2	100.5
	Newpoint Stone Co.	Napoleon	L	83.2	8.0	92.7
	Southeastern Material Corp.	Osgood	L	78.2	10.2	90.3
Rush	McCorkle Stone Co.	Milroy	L	57.2	39.1	103.5
	Rush County Stone Co.	Moscow	L	57.2	39.1	103.5
St. Joseph	Futa Bros.	Sousley Lake	M	87.4	4.0	92.1
	Inman Whitmer	Whitmer Farm	M	91.6	2.4	94.4
Scott	Scott County Limestone Co.	Lexington	L	84.1	10.8	96.8
Shelby	Cave Stone Co.	Norristown	L	58.8	38.5	104.4
	St. Paul Quarries	St. Paul	L	80.7	11.7	94.6
Steuben	Taylor & Son	Miserva Lake	M	92.4	3.3	96.3
	Taylor & Son	Abbott Pit	M	90.7	3.0	94.3
	Taylor & Son	Hilton Pit-Kinderhook,	M	90.7	3.0	94.3
	Taylor & Son	Garman Pit-Kinderhook, Mich.	M	90.0	3.0	93.6
Sullivan	Kixmiller Bros.	Freelandville	L	84.0	3.5	88.2
Switzerland	Tri-County Stone Co.	Cross Plains	L	67.2	19.5	90.3
Vermillion	Material Service Corp.	Fairmount, Illinois	L	94.1	1.2	95.5
Vigo	Quality Lime Co.	Marshall	L	80.7	4.0	85.4
Wabash	Mill Creek Stone & Gravel	Wabash	L	44.6	33.3	84.1
Washington	Hoosier Lime & Stone Co.	Salem	L	92.4	3.7	96.8
Wayne	American Aggregates Corp.	Phillipsburg, Ohio	L	52.1	44.4	104.7
	Armco Steel, Piqua Quarries	Piqua, Ohio	L	84.1	13.5	100.1
	DeBolt Concrete Co.	Middleboro	L	58.8	33.2	98.1
	Marble Cliff Quarries	Lewisburg, Ohio	L	95.8	3.0	99.4



County	Producer and/or Vendor	Location of Source	Type of Material	Percent CaCO <sub>3</sub>	Percent MgCO <sub>3</sub>	Total Neutralizing Value
Wells	Erie Stone Co.	Bluffton	L	52.1	43.8	104.0
White	Monon Crushed Stone Co.	Monon	L	48.8	36.2	91.6
	The Ward Stone Co., Inc.	Monon	L	56.3	41.3	105.2

Historic Document