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DECEMBER 1977

1978  
**FERTILIZER**  
Situation

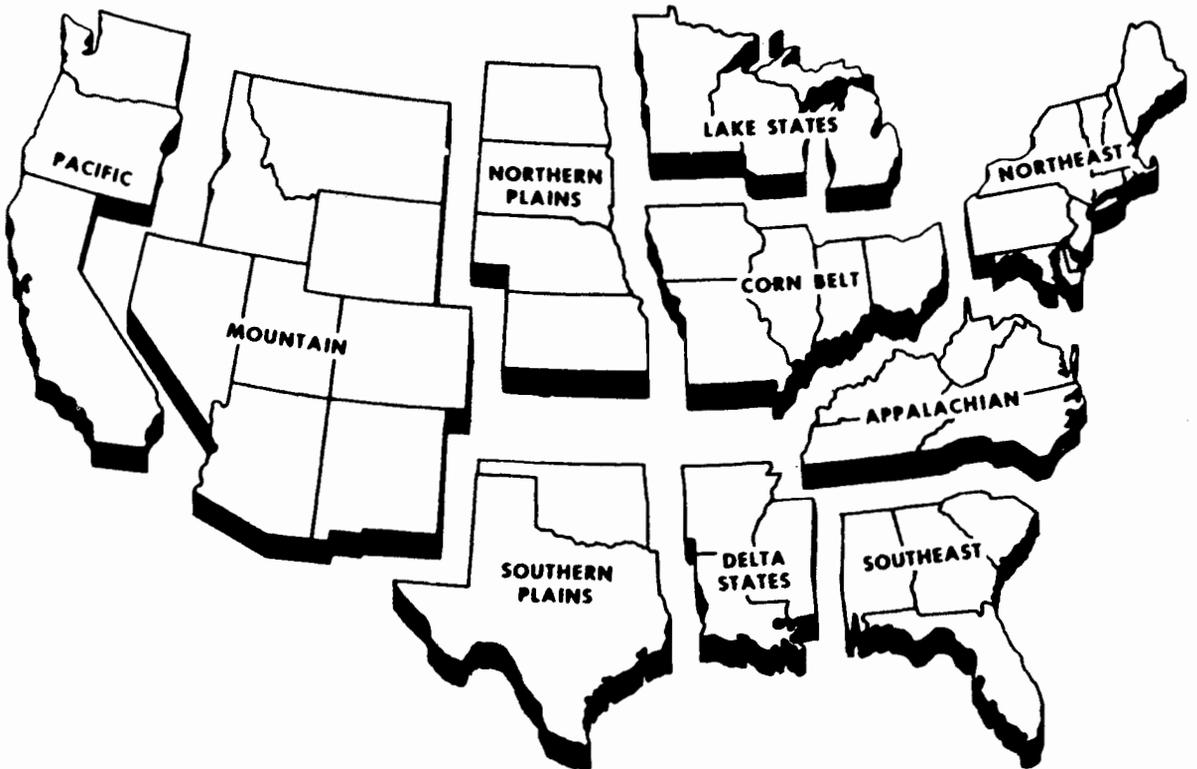


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Conversion Factors

To convert	To	Multiply by
P <sub>2</sub> O <sub>5</sub> .....	P	0.43642
P .....	P <sub>2</sub> O <sub>5</sub>	2.29137
K <sub>2</sub> O .....	K	.83016
K .....	K <sub>2</sub> O	1.20459
Anhydrous ammonia .....	N	.82
Urea .....	N	.46
Ammonium nitrate .....	N	.335
Ammonium sulfate .....	N	.205
Sodium nitrate .....	N	.16
Superphosphate:		
20 percent P <sub>2</sub> O <sub>5</sub> .....	P	.08728
46 percent P <sub>2</sub> O <sub>5</sub> .....	P	.20075
Potash:		
60 percent K <sub>2</sub> O .....	K	.49810
62 percent K <sub>2</sub> O .....	K	.51470
Potassium chloride .....	K <sub>2</sub> O	.63177
Metric tons (tonnes, 2204.6 av. lbs.)	Short tons	1.10231
Long tons (2240 av. lbs.) .....	Short tons	1.12

## FARM PRODUCTION REGIONS



# 1978 FERTILIZER SITUATION

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## SUMMARY

U.S. farmers can probably anticipate steady to lower fertilizer prices through next spring in the face of ample supplies and possibly weaker demand. Relatively low farm commodity prices and the set-aside programs could cause domestic use to total near or below the record level for the July-June 1976/77 fertilizer year. At the same time, if current production levels hold, supplies will be more than adequate to meet the needs of U.S. farmers in 1977/78.

U.S. fertilizer inventories are abundant this fall, with nitrogen inventories well above year-earlier levels. Anhydrous ammonia capacity increased sharply during 1977, and phosphoric acid and potash capacities remain close to levels of a year ago.

Fertilizer use by farmers increased about 5 percent in 1976/77 to a record high of 51.6 million tons, but farm prices for fertilizer held relatively stable. Of the primary nutrients, nitrogen use was up about 2 percent to 10.6 million tons; phosphate use increased 8 percent to 5.6 million tons; and potash use was up 12 percent to 5.8 million tons. Fertilizer use by regions reflected drought conditions in the Mountain States, generally favorable crop price prospects at planting time in the Southeast and Appalachian regions, and increased cotton acreage in the Southern Plains.

Application rates of the three primary nutrients on acreage harvested in 1977 were up for corn and wheat but were mixed for cotton and soybeans. The percent of acres fertilized in 1977 was about the same as a year earlier for corn, was down for wheat, and was up for cotton and soybeans. In 1977/78, fertilizer application rates are expected to increase, but increased application rates may not offset the reduction caused by putting land in set aside programs.

U.S. anhydrous ammonia production capacity rose 16 percent in 1977 to 22.7 million tons. Total phosphoric acid production capacity at 9.3 million tons is expected to remain about the same for the 1977/78 fertilizer year.

Potash production capacity remained unchanged during 1977. U.S. production capacity is currently about 3.0 million tons, while North American capacity is about 11.7 million tons. U.S. demand for potash continues to exceed domestic

production, and the United States remains a net importer of potash from Canada.

The United States was a net importer of nitrogen and potash and a net exporter of phosphates in the 1976/77 fertilizer year. The declared value of U.S. fertilizer exports declined from about \$1.3 billion in 1975/76 to \$1.1 billion in 1976/77 because of lower world market prices. The United States maintained its position as the largest exporter of phosphate fertilizer and the largest importer of potash in 1976/77. The U.S. Agency for International Development (AID) financed the export of over 210,000 metric tons of fertilizer products, the lowest tonnage of AID-financed fertilizer purchases in recent years.

Preliminary estimates indicate that total world fertilizer consumption may have reached nearly 96 million metric tons of plant nutrients in 1976/77, well above the previous year's total. World fertilizer consumption in 1975/76 set a record of 88.7 million metric tons, nearly a 10-percent increase over 1974/75.

World consumption of nitrogen fertilizers for 1976/77 totaled an estimated 45.9 million metric tons, a 6-percent increase over 1975/76. World consumption of phosphate fertilizers was up an estimated 9 percent in 1976/77 to 26.3 million metric tons, while potash use rose an estimated 11 percent.

World fertilizer consumption is expected to continue to increase in the 1977/78 fertilizer year. Nitrogen and phosphate consumption may increase about 7 percent, while potash consumption is expected to be up about 5 percent.

The trend of increasing fertilizer availability continued through the 1976/77 fertilizer year. World supplies of nitrogen were likely up about 5 percent to 46 million metric tons, while phosphate and potash supplies were up 23 and 12 percent, respectively. In 1977/78, nitrogen supplies are expected to be up over 10 percent, while phosphate and potash supplies will each be up 4 to 5 percent.

International fertilizer prices reversed their downward plunge during 1976/77. Prices moved moderately upward until they softened in recent months, partly due to sluggish fall demand in the United States.

Projections of world supply and demand for the three primary plant nutrients through 1981/82 indicate that world supplies should be more than adequate to meet world demand during this period. Surplus supply capabilities should continue for all nutrients through 1981/82, with the capability surpluses expected to increase for nitrogen, to diminish for phosphate, and to change little for potash. Developing countries are projected to significantly increase their production capacities for nitrogen and phosphates during the next 5 years.

## U.S. OUTLOOK FOR 1977/78<sup>1</sup>

Fall 1977 inventories held by manufacturers were above those of a year earlier (figure 1). Nitrogen and phosphate ( $P_2O_5$ ) inventories in September were about a third above year-ago levels, while inventories of potassium ( $K_2O$ ) were unchanged. Anhydrous ammonia capacity increased sharply in 1977, but wet process phosphoric acid capacity remained about the same as a year earlier. With the gains in production capacity and steady production levels, fertilizer supplies will be adequate to meet the needs of U.S. farmers in the 1977/78 fertilizer year at steady to lower prices.

Generally low crop prices and the set-aside programs for wheat and feed grains will likely lead to changes in plantings of some major crops in 1978. Wheat area may decline 7 to 9 million acres and corn acres without a set-aside program, could range from about the same as in 1977 to down as much as 2 million acres. Cotton acres could be down 0.8 to 1.8 million acres, while soybean acreage could be the same as last year or could drop as much as 2 million acres. These shifts in crop acres planted could lead to some easing in fertilizer demand. Fer-

tilizer application rates are expected to increase on acres planted, but increased application rates will not likely offset the reduction caused by putting land in set-aside programs.

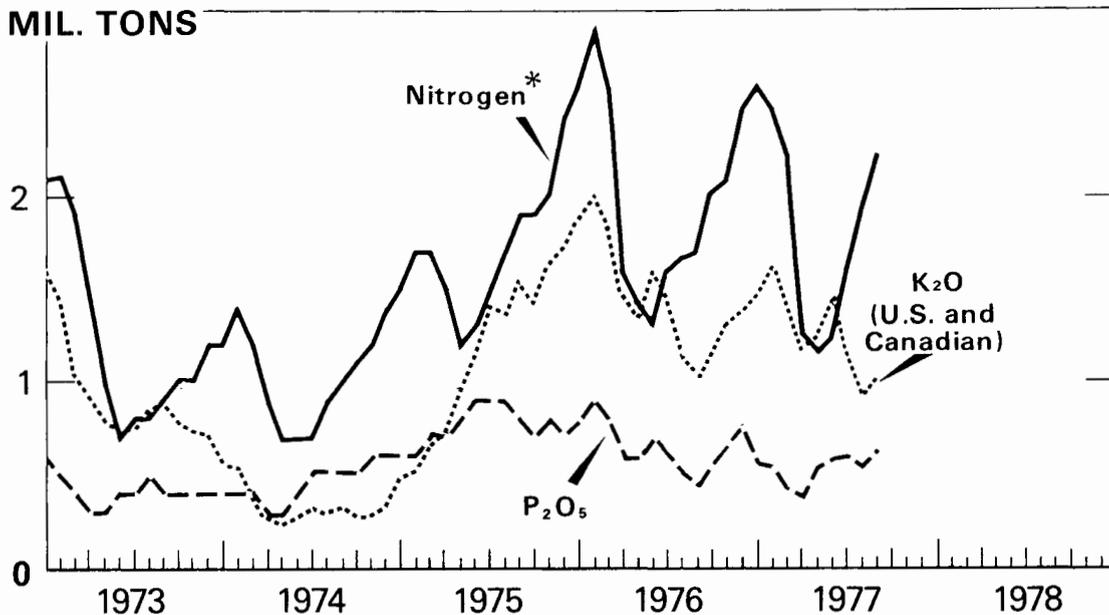
*Nitrogen:* Annual U.S. capacity to produce synthetic anhydrous ammonia for both fertilizers and industrial use was about 19.6 million tons on January 1, 1977. Additional capacity has come on stream since then, and capacity at the beginning of 1978 will be about 22.7 million tons, a 16-percent increase during 1977.

At the end of September, nitrogen inventories at the manufacturer's level were about 2.2 million tons, about 500,000 tons above a year ago. From July 1 to October 1, nitrogen inventories increased by about 1.0 million tons, while ammonia prices continued to fall. October 1 inventories of anhydrous ammonia, ammonium nitrate, and nitrogen solutions were up substantially from year earlier levels (table 1).

<sup>1</sup>July 1, 1977 to June 30, 1978. All references to split years refer to the *July-June* fertilizer year.

# FERTILIZER MANUFACTURERS' INVENTORIES, 1973 TO 1977

Nitrogen, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O



\*DOES NOT INCLUDE UREA.

USDA

NEG. ERS 2623-77 (11)

Figure 1

For 1977/78, domestic nitrogen consumption is forecast at 10.4 to 10.7 million tons, compared with 10.6 million for 1976/77. The net domestic supply could reach the 12-million-ton mark, adding further to carryover inventories. With such a supply-demand outlook, it seems likely that nitrogen prices will decline.

**Phosphate fertilizers:** Domestic annual capacity to produce wet-process phosphoric acid on January 1, 1977, was estimated to be about 9.3 million tons of P<sub>2</sub>O<sub>5</sub>. Capacity for 1977/78 is expected to remain about the same.

Inventories of P<sub>2</sub>O<sub>5</sub> in phosphate fertilizers and wet-process phosphoric acid were below 1976 levels in the early months of 1977. Inventories increased to where manufacturers' inventories were equal to year-earlier levels in June 1977. By October 1, inventories exceeded those of a year earlier by about 35 percent. Production of processed phos-

phate fertilizers in September 1977 was 12 percent above production in July. Phosphoric acid production for fertilizer increased 10 percent between the same months.

Phosphate consumption is forecast to range from 5.4 to 5.6 million tons in 1977/78, compared with 5.6 million tons in 1976/77. Supplies of phosphate fertilizers should be ample to meet expected demand at steady to lower prices.

**Phosphate rock:** Phosphate rock sold or used by producers in 1976/77 totaled 48.4 million tons, up about 7 percent from year-earlier levels. The export market continued to recover from the 12-percent decline in 1975/76. Export tonnage increased 8 percent in 1976/77 to 12.8 million tons. Producers' stocks of phosphate rock on June 30, 1977 were 13 percent above year-earlier levels. During July-September 1977, U.S. producers' inventories of phosphate rock continued to increase and, on October 1,

**Table 1—Manufacturers' inventories of nitrogenous and phosphatic fertilizer materials and phosphoric acid, United States, and muriate of potash, United States and Canada, October 1, 1976 and 1977**

Material	October 1, 1976 <sup>1</sup>	October 1, 1977 <sup>1</sup>	Change
	1,000 tons	1,000 tons	Percent
<b>Nitrogenous fertilizer inventories:<sup>2</sup></b>			
Anhydrous ammonia <sup>3</sup> . . . . .	1,655	1,994	21
Ammonium nitrate, solid . . . . .	161	277	72
Nitrogen solutions . . . . .	279	449	61
Ammonium sulfate <sup>4</sup> . . . . .	255	231	-9
<b>Phosphatic fertilizer inventories:<sup>5</sup></b>			
Normal and enriched superphosphate . . . . .	63	50	-21
Concentrated superphosphate . . . . .	69	112	62
Diammonium phosphates . . . . .	115	236	105
Other ammonium phosphates . . . . .	60	56	-7
Other phosphatic fertilizer materials . . . . .	23	16	-30
Total phosphatic fertilizers . . . . .	330	470	42
Wet process phosphoric acid inventories: <sup>5</sup> . . . . .	105	159	50
<b>Muriate of potash inventories:<sup>6</sup></b>			
United States . . . . .	492	277	-44
Canada . . . . .	517	732	42

<sup>1</sup> All figures subject to revision. <sup>2</sup> Nitrogen solutions reported in 1,000 tons of N. Others reported in 1,000 tons of material. <sup>3</sup> Includes material for nonfertilizer use. <sup>4</sup> Includes synthetic, byproduct coke oven, and by product, other than coke oven. <sup>5</sup> Reported in 1,000 tons of P<sub>2</sub>O<sub>5</sub>. <sup>6</sup> Reported in 1,000 tons of K<sub>2</sub>O.

Sources: Nitrogenous and phosphatic materials: *Current Industrial Reports*, M28B, "Inorganic Fertilizer Materials and Related Products", September 1977, U.S. Dept. of Commerce, Bureau of the Census. Muriate of potash: Potash/Phosphate Institute.

1977, they totaled about 14.2 million tons. U.S. production of marketable phosphate rock increased less than 1 percent to 49.5 million tons in 1976/77.

## U.S. FERTILIZER INVENTORIES, PRODUCTION LEVELS, PRICES, AND USE—1976/77

### Manufacturers' Inventories

The favorable planting weather and good crop prospects early in the 1976/77 season caused farmers to apply record amounts of fertilizer. The early shipments caused inventories to fall below year-earlier levels.

Manufacturers' inventories of synthetic anhydrous ammonia on March 1, 1977, amounted to about 2.4 million tons—8 percent lower than inventory levels 1 year earlier (table 2). Also, inventories

If present production levels are maintained, and with the inventories on hand, the overall outlook for the 1977/78 fertilizer year is for sufficient supplies of phosphate rock to meet the needs of U.S. fertilizer producers and export requirements as well.

**Potash:** Annual U.S. capacity to produce potash was over 3.0 million tons of K<sub>2</sub>O on January 1, 1977. Canadian production capacity on the same date was about 8.7 million tons, bringing total production capacity for both nations to about 11.7 million tons, about the same as on January 1, 1976. Potash production capacity in the United States is not expected to change significantly in the next few years, but Canadian capacity may increase about 10 percent. Inventories of potash in the United States and Canada have declined since the start of 1977. As of October 1, 1977, the 1.0 million tons of stocks in the two countries were equal to year-earlier stocks (table 1).

Use of potash by U.S. farmers was about 5.8 million tons in 1976/77. This exceeds annual production capacity, so the United States will have to continue to import about three-fourths of its needs from Canada. Potash consumption in 1977/78 is forecast to range from 5.5 to 5.8 million tons, compared with 5.8 million in 1976/77.

The Provincial government of Saskatchewan is continuing toward its goal of assuming ownership and control of one-half of potash production capacity in Saskatchewan. The Potash Corporation of Saskatchewan (PCS) has acquired three mines, bringing its control to about 25 percent of Saskatchewan capacity. PCS may also add about 1.0 million tons capacity in the next few years. If Canadian prices and output remain relatively stable, supplies of potash should be more than sufficient to meet the demands of both the United States and Canada in 1977/78. However, the potential full effects of the entry of the Provincial government into Saskatchewan industry are as yet unknown.

of ammonium nitrate, nitrogen solutions, and ammonium sulfate were substantially lower.

Manufacturers' inventories of normal and enriched superphosphate were down 25 percent from March 1, 1976, to March 1, 1977. This decline was coupled with a large decline in stocks of ammonium phosphates and other phosphatic fertilizers. Total inventories of phosphate fertilizers were down 42 percent from a year earlier.

Inventories of potash fertilizers followed the same pattern as other fertilizers. Potash stocks of

**Table 2—Manufacturers' inventories of nitrogenous and phosphatic fertilizer materials and phosphoric acid, United States, and muriate of potash, United States and Canada, March 1, 1976 and 1977**

Material	March 1,	March 1,	Change
	1976 <sup>1</sup>	1977 <sup>1</sup>	
	<i>1,000 tons</i>	<i>1,000 tons</i>	<i>Percent</i>
Nitrogenous fertilizer inventories: <sup>2</sup>			
Anhydrous ammonia <sup>3</sup> . . . . .	2,545	2,349	-8
Ammonium nitrate . . . . .	295	243	-18
Nitrogen solutions . . . . .	582	393	-32
Ammonium sulfate <sup>4</sup> . . . . .	390	262	-33
Phosphatic fertilizer inventories: <sup>5</sup>			
Normal and enriched superphosphate . . . . .	67	50	-25
Concentrated superphosphate . . . . .	183	126	-31
Diammonium phosphates . . . . .	298	142	-52
Other ammonium phosphates . . . . .	81	53	-35
Other phosphatic fertilizer materials . . . . .	35	16	-54
Total phosphatic fertilizers . . . . .	664	387	-42
Wet process phosphoric acid inventories: <sup>5</sup> . . . . .	190	160	-16
Muriate of potash inventories: <sup>6</sup>			
United States . . . . .	667	460	-31
Canada . . . . .	1,323	1,161	-12

<sup>1</sup> All figures subject to revision. <sup>2</sup> Nitrogen solutions reported in 1,000 tons of N. Others reported in 1,000 tons of material. <sup>3</sup> Includes material for nonfertilizer use. <sup>4</sup> Includes synthetic, by-product coke oven, and by product, other than coke oven. <sup>5</sup> Reported in 1,000 tons of P<sub>2</sub>O<sub>5</sub>. <sup>6</sup> Reported in 1,000 tons of K<sub>2</sub>O.

Sources: Nitrogenous and phosphatic materials: *Current Industrial Reports*, M28B, "Inorganic Fertilizer Materials and Related Products", February and March 1977, U.S. Dept. of Commerce, Bureau of the Census. Muriate of potash: Potash/phosphate Institute.

U.S. manufacturers from March 1, 1976 to March 1, 1977 declined 31 percent, and stocks of Canadian manufacturers declined 12 percent.

### Fertilizer Production Levels

Fertilizer production levels for the year ending June 30, 1977, were up from the previous year. Production was up for all three primary nutrients—N, P<sub>2</sub>O<sub>5</sub>, and K<sub>2</sub>O.

The amount of anhydrous ammonia manufactured for fertilizer and nonfertilizer use in 1976/77 was up about 3 percent to over 16.6 million tons (table 3). Production of nitrogen solutions was also up a substantial 20 percent, with urea and ammonium sulfate also up slightly from 1975/76.

Total production of processed phosphate fertilizers in 1976/77 was up about 19 percent to about 6.4 million tons of P<sub>2</sub>O<sub>5</sub> (table 3). Production of

concentrated superphosphate was up 18 percent from about 1.5 million tons to over 1.7 million tons. Diammonium phosphate production was up substantially, 24 percent, to 3.2 million tons. Production of normal and enriched superphosphate was down 3 percent.

Combined U.S. and Canadian production of muriate of potash was up from 1975/76. U.S. production in 1976/77 was about the same as in 1975/76 at 2.4 million tons, but Canadian production was up 17 percent to over 6.2 million tons (table 3).

### Farm Prices for Fertilizer

Prices paid by U.S. farmers for nitrogenous and phosphatic fertilizer materials and for muriate of

**Table 3—Production of nitrogenous and phosphatic fertilizer materials and phosphoric acid, United States, and muriate of potash, United States and Canada, years ending June 30, 1976 and 1977**

Material	1976 <sup>1</sup>	1977 <sup>1</sup>	Change
	<i>1,000 tons</i>	<i>1,000 tons</i>	
Nitrogenous fertilizers: <sup>2</sup>			
Anhydrous ammonia <sup>3</sup> . . . . .	16,178	16,676	+3
Ammonium nitrate, solid . . . . .	3,338	3,307	-1
Urea . . . . .	3,824	3,867	+1
Nitrogen solutions . . . . .	1,999	2,399	+20
Ammonium sulfate <sup>4</sup> . . . . .	2,250	2,301	+2
Phosphatic fertilizers: <sup>5</sup>			
Normal and enriched superphosphate . . . . .	371	361	-3
Concentrated superphosphate . . . . .	1,482	1,746	+18
Diammonium phosphates . . . . .	2,623	3,244	+24
Other ammonium phosphates . . . . .	621	824	+33
Other phosphatic fertilizer materials . . . . .	231	231	0
Total phosphatic fertilizers . . . . .	5,367	6,406	+19
Wet process phosphoric acid: <sup>5 6</sup> . . . . .	6,521	7,769	+19
Muriate of potash: <sup>7</sup>			
United States . . . . .	2,447	2,413	-1
Canada . . . . .	5,337	6,234	+17

<sup>1</sup> All figures subject to revision. <sup>2</sup> Nitrogen solutions reported in 1,000 tons of N. Others reported in 1,000 tons of material. <sup>3</sup> Includes material for nonfertilizer use. <sup>4</sup> Includes synthetic, by-product coke oven, and by product, other than coke oven. <sup>5</sup> Reported in 1,000 tons of P<sub>2</sub>O<sub>5</sub>. <sup>6</sup> Includes merchant acid. <sup>7</sup> Reported in 1,000 tons of K<sub>2</sub>O.

Sources: Ammonium sulfate (coke oven): *Mineral Industry Surveys*, "Coke and Coal Chemicals", July 1977 and earlier issues, U.S. Dept. of Interior, Bureau of Mines. Urea: "Preliminary Report on U.S. Production of Selected Synthetic Organic Chemicals", July, August 1977 and earlier issues, U.S. International Trade Commission. Other nitrogenous and phosphatic materials: *Current Industrial Reports*, M28B, "Inorganic Fertilizer Materials and Related Products," August 1977 and earlier issues, U.S. Dept. of Commerce, Bureau of the Census. Muriate of Potash: Potash/phosphate Institute.

potash in 1976/77 were close to those of a year earlier. Anhydrous ammonia prices weakened as the fertilizer year progressed. This pressure on prices is expected to continue because of the abundant domestic and offshore supplies, with more downward pressure expected on nitrogen fertilizer prices than on prices for phosphatic and potassic fertilizers.

*Nitrogen fertilizer prices:* Largely because of the increased production capacity and a fairly flat demand situation, farm prices of anhydrous ammonia on May 15, 1977, and October 15, 1977, were below those of a year earlier (table 4). Prices of other nitrogenous fertilizer materials were close to or up from May 1977. In the period April 15, 1976 to May 15, 1977, anhydrous ammonia prices declined, while prices of ammonium sulfate, ammonium nitrate, and urea increased modestly (table 5). During the 6-month period from May 15, 1977, to October 15, 1977, farm prices of ammonium sulfate, ammonium nitrate, and 30 and 32-percent nitrogen solutions remained steady. Prices of urea, anhydrous ammonia, and 28-percent nitrogen solutions declined.

*Phosphatic fertilizer prices:* Farm prices of phosphatic fertilizers in October 1977 were up from year-earlier levels (tables 4 and 6). Normal superphosphate (22-percent P<sub>2</sub>O<sub>5</sub>) prices in 1977 were

above those of 1976, while October 1977 prices of the more concentrated product (46-percent P<sub>2</sub>O<sub>5</sub>) were close to May 1977 prices and above October 15, 1976, prices. In 1977 prices of 18-46-0 were above 1976 fall prices and close to April 15, 1976, prices.

*Potash fertilizer prices:* Of the three primary plant nutrients, prices of potash exhibited the least fluctuation from April 1976 to October 1977. U.S. farmers paid \$95.90 for a ton of potash (60-percent K<sub>2</sub>O) in mid-April 1976 and by mid-October the price had declined to \$94.50, a 1 percent decline (table 4).

#### Fertilizer Use Estimates

In the 12-month period ending June 30, 1977, nearly 51.6 million tons of fertilizer were used in the United States and Puerto Rico (table 7). This represents an increase of nearly 2.4 million tons or 5 percent making 1976/77 the second consecutive record year. Although a new record for fertilizer consumption was set, increases in use of individual fertilizer nutrients ranged widely. Use of nitrogen was up about 2 percent, P<sub>2</sub>O<sub>5</sub> use was up 8 percent, and potash use was up about 12 percent.

*Regional variations:* Total use of the three primary nutrients showed considerable variability between crop production regions in 1976/77 (table

Table 4—Average prices paid by farmers per ton of selected fertilizers, United States, April 15 prices, 1966-76, May 15 prices 1977, and October 15 prices 1976-77

Year	Anhydrous ammonia	Superphosphate		18-46-0	Potash 60 percent K <sub>2</sub> O	Mixed fertilizer 6-24-24
		46 percent P <sub>2</sub> O <sub>5</sub>	20 percent P <sub>2</sub> O <sub>5</sub>			
<i>Dollars</i>						
1966 .....	119.00	80.90	41.40	108.00	<sup>1</sup> 59.89	85.10
1967 .....	113.00	84.10	42.10	113.00	<sup>1</sup> 58.47	85.70
1968 .....	91.40	78.40	43.20	101.00	49.10	81.80
1969 .....	75.60	74.00	43.80	94.10	47.80	73.20
1970 .....	75.00	75.10	45.40	94.40	50.90	75.00
1971 .....	79.30	76.60	47.80	95.70	58.20	80.30
1972 .....	80.00	78.00	49.90	97.40	58.80	81.00
1973 .....	87.60	87.50	53.70	109.00	61.50	88.00
1974 .....	183.00	150.00	91.40	181.00	81.30	139.00
1975 .....	265.00	214.00	118.00	263.00	102.00	186.00
1976:						
Apr. 15 .....	191.00	158.00	95.20	189.00	95.90	148.00
Oct. 15 .....	182.00	146.00	95.10	177.00	94.20	141.00
1977:						
May 15 .....	188.00	148.00	103.00	185.00	96.90	145.00
Oct. 15 .....	177.00	150.00	100.00	187.00	94.50	146.00

<sup>1</sup> Based on equivalent price for 55 percent K<sub>2</sub>O reported by SRS.

Source: "Agricultural Prices", USDA, SRS, Pr 1 (10-77) and earlier issues.

**Table 5—Average prices paid by farmers per 20-pound unit of nitrogen contained in nitrogenous materials, United States, 1966-1977**

Year	Nitrate of soda	Sulfate of ammonia	Ammonium nitrate	Urea	Anhydrous ammonia	Nitrogen solutions percent N		
						28	30	32
<i>Dollars</i>								
1966 .....	3.73	2.58	2.28	2.22	1.45	---	---	---
1967 .....	3.76	2.64	2.21	2.18	1.38	---	---	---
1968 .....	3.74	2.63	2.03	2.02	1.11	1.95	2.09	2.06
1969 .....	3.74	2.56	1.84	1.84	.92	1.49	1.79	1.80
1970 .....	3.89	2.56	1.79	1.82	.91	1.64	1.80	1.83
1971 .....	4.07	2.52	1.89	1.80	.97	1.79	1.87	1.90
1972 .....	4.13	2.54	1.93	1.79	.98	1.85	1.84	1.96
1973 .....	4.84	2.69	2.13	1.98	1.07	2.05	1.94	2.09
1974 .....	8.19	5.37	4.15	4.02	2.23	4.11	3.70	3.97
1975 .....	12.38	7.32	5.55	5.36	3.23	5.68	5.10	5.25
1976:								
Apr. 15 .....	9.63	4.79	4.03	3.65	2.33	3.89	3.77	4.09
Oct. 15 .....	9.31	4.62	4.09	3.69	2.22	3.86	3.73	4.09
1977:								
May .....	9.17	4.97	4.30	3.72	2.29	4.11	4.03	4.25
Oct. 15 .....	9.24	5.00	4.28	3.66	2.14	4.00	3.96	4.24

Source: Computed from "Agricultural Prices", USDA, SRS, Pr 1 (10-77) and earlier issues.

**Table 6—Average prices paid by farmers per 20 pound unit of P<sub>2</sub>O<sub>5</sub> contained in phosphate materials, and K<sub>2</sub>O in muriate, of potash, United States, 1966-77**

Year	Superphosphate		Muriate of potash <sup>3</sup>
	Normal <sup>1</sup>	Concentrated <sup>2</sup>	
<i>Dollars</i>			
1966 .....	2.07	1.76	1.00
1967 .....	2.11	1.83	.97
1968 .....	2.16	1.70	.82
1969 .....	2.19	1.61	.80
1970 .....	2.27	1.63	.85
1971 .....	2.39	1.67	.97
1972 .....	2.50	1.70	.98
1973 .....	2.69	1.90	1.03
1974 .....	4.57	3.26	1.36
1975 .....	5.90	4.65	1.70
1976:			
Apr. 15 .....	4.76	3.43	1.60
Oct. 15 .....	4.76	3.17	1.57
1977:			
May 15 .....	5.15	3.22	1.61
Oct. 15 .....	5.00	3.26	1.56

<sup>1</sup> 20 percent P<sub>2</sub>O<sub>5</sub>. <sup>2</sup> 46 percent P<sub>2</sub>O<sub>5</sub>. <sup>3</sup> 60 percent K<sub>2</sub>O; 55 percent K<sub>2</sub>O prior to 1968.

Source: Computed from "Agricultural Prices", USDA, SRS, Pr 1 (10-77) and earlier issues.

8). Nitrogen use increased in 7 of the 10 crop production regions, with use increasing the most—12 percent—in the Appalachian region. In the three

regions in which nitrogen use declined, the largest decline—4 percent—was the Mountain region (table 9). Phosphate fertilizer use increased in 9 of the 10 regions, with the largest increase—about 15 percent—occurring in the Delta region. The only decline occurred in the Mountain region where use dropped 1 percent (table 10). K<sub>2</sub>O use was up in all regions (table 11).

Drought was probably an important factor in reducing fertilizer use in the Mountain States. Insufficient rainfall probably discouraged farmers from applying the usual amount of fertilizer. In the Southeast and Appalachian regions, favorable crop prospects encouraged farmers to apply generous amounts of fertilizer, while more soybean acres in the Delta States and more cotton acres in the Southern Plains contributed to increased fertilizer use.

*Use of mixtures and direct application materials:* The proportions of fertilizers applied as a mixture or direct application material in 1976/77 were the same as those of a year earlier. Forty-seven percent of fertilizers were applied as a mixture. Direct application materials amounted to 53 percent of total fertilizer use (table 12).

*Use of dry bagged, dry bulk, and liquid fertilizers:* The trend toward increased use of liquid fertilizers continued in 1975/76 (table 13). (Data for 1976/77 will be published shortly).

**Table 7—All fertilizer: Total use and primary nutrient use, United States, 1960-1977<sup>1</sup>**

Year ended June 30	Total use	Primary Nutrient Use				
		N	Available P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Total	Index
		<i>1,000 tons</i>			<i>1967=100</i>	
1960.....	24,877	2,738.0	2,572.4	2,153.3	7,463.7	53.4
1961.....	25,567	3,030.8	2,645.1	2,168.5	7,844.4	56.1
1962.....	26,615	3,370.0	2,807.0	2,270.5	8,447.5	60.5
1963.....	28,844	3,929.1	3,072.9	2,503.4	9,505.4	68.0
1964.....	30,681	4,352.8	3,377.8	2,729.7	10,460.3	74.9
1965.....	31,836	4,638.5	3,512.2	2,834.5	10,985.3	78.6
1966.....	34,532	5,326.3	3,897.1	3,221.2	12,444.6	89.1
1967.....	37,081	6,027.1	4,304.7	3,641.8	13,973.6	100.0
1968.....	38,743	6,787.6	4,453.3	3,792.6	15,033.5	107.6
1969.....	38,949	6,957.6	4,665.6	3,891.6	15,514.8	111.0
1970.....	39,589	7,459.0	4,573.9	4,035.5	16,068.3	115.0
1971.....	41,118	8,133.6	4,803.4	4,231.4	17,168.4	122.9
1972.....	43,288	8,022.3	4,863.7	4,326.8	17,212.8	123.2
1973.....	43,288	8,295.1	5,085.2	4,648.7	18,029.0	129.0
1974.....	47,094	9,157.2	5,098.6	5,082.6	19,338.4	138.4
1975.....	42,484	8,600.8	4,506.8	4,453.2	17,560.9	125.6
1976.....	49,189	10,411.6	5,227.6	5,209.7	20,848.8	149.2
1977.....	51,612	10,641.9	5,621.8	5,833.0	22,096.6	158.1

<sup>1</sup> Includes Puerto Rico.

Source: "Commercial Fertilizers, Consumption for year ended June 30, 1977", USDA, SRS, SpCr 7 (11-77) and earlier issues.

**Table 8—Total use of primary nutrients by regions, years ended June 30, 1976 and 1977**

Region	1976	1977 <sup>1</sup>	Change
	<i>1,000 tons</i>		
Northeast.....	906	984	9
Lake States.....	2,356	2,497	6
Corn Belt.....	7,027	7,324	4
Northern Plains.....	2,292	2,444	7
Appalachian.....	1,671	1,866	12
Southeast.....	1,975	2,177	10
Delta States.....	913	992	9
Southern Plains.....	1,454	1,529	5
Mountain.....	847	816	-3
Pacific.....	1,380	1,430	4
United States.....	20,815	22,059	6

<sup>1</sup> Totals may not add due to rounding.

**Table 10—Use of phosphate as fertilizer, by regions, years ended June 30, 1976 and 1977**

Region	1976	1977 <sup>1</sup>	Change
	<i>1,000 tons P<sub>2</sub>O<sub>5</sub></i>		
Northeast.....	283	310	9
Lake States.....	611	623	2
Corn Belt.....	1,735	1,844	6
Northern Plains.....	545	581	7
Appalachian.....	468	526	12
Southeast.....	429	485	13
Delta States.....	205	237	16
Southern Plains.....	367	391	7
Mountain.....	267	264	-1
Pacific.....	311	354	13
United States.....	5,221	5,615	7

<sup>1</sup> Totals may not add due to rounding.

**Table 9—Use of nitrogen as fertilizer, by regions, years ended June 30, 1976 and 1977**

Region	1976	1977 <sup>1</sup>	Change
	<i>1,000 tons N</i>		
Northeast.....	317	344	8
Lake States.....	917	942	3
Corn Belt.....	3,156	3,096	-2
Northern Plains.....	1,611	1,705	6
Appalachian.....	624	701	12
Southeast.....	832	903	9
Delta States.....	485	488	0
Southern Plains.....	977	1,005	3
Mountain.....	539	515	-4
Pacific.....	936	926	-1
United States.....	10,394	10,624	2

<sup>1</sup> Totals may not add due to rounding.

**Table 11—Use of potash as fertilizer, by regions, years ended June 30, 1976 and 1977**

Region	1976	1977 <sup>1</sup>	Change
	<i>1,000 tons K<sub>2</sub>O</i>		
Northeast.....	306	330	8
Lake States.....	828	932	12
Corn Belt.....	2,136	2,384	12
Northern Plains.....	136	158	16
Appalachian.....	579	639	10
Southeast.....	714	789	11
Delta States.....	222	267	12
Southern Plains.....	110	133	21
Mountain.....	35	37	7
Pacific.....	133	150	13
United States.....	5,198	5,820	12

<sup>1</sup> Totals may not add due to rounding.

**Table 12—All fertilizer: Mixtures and direct-application materials used, averages 1951-1970, annual 1971-1977, United States<sup>1</sup>**

Year ended June 30	All fertilizer	Mixtures		Materials <sup>2</sup>	
		Quantity	Percentage of total	Quantity	Percentage of total
		1,000 tons	Percent	1,000 tons	Percent
Average:					
1951-1955 .....	22,183	14,904	67	7,280	33
1956-1960 .....	22,670	14,904	66	8,366	37
1961-1965 .....	28,455	16,929	59	11,526	41
1966-1970 .....	37,598	20,693	55	16,904	45
1971 .....	40,982	21,388	52	19,594	48
1972 .....	41,059	21,375	52	19,684	48
1973 .....	43,149	22,420	52	20,729	48
1974 .....	46,933	23,935	51	22,998	49
1975 .....	42,356	20,536	48	21,820	52
1976 .....	49,080	22,856	47	26,223	53
1977 .....	51,491	23,978	47	27,513	53

<sup>1</sup> Excludes Puerto Rico. <sup>2</sup> Primary nutrients plus secondary and micronutrient materials not included in commercial mixtures.

Sources: "Commercial Fertilizers, Consumption For Year Ended June 30, 1977", USDA, SRS, SpCr7 (11-77) and earlier issues. "Commercial Fertilizers, Consumption of Commercial Fertilizers, Primary Plant Nutrients, and Micronutrients", USDA, SRS, Statistical Bulletin No. 472.

**Table 13—All fertilizers: Use by class, mixtures and direct application materials 1967-1976<sup>1 2</sup>**

Year ended June 30	Dry bagged	Percentage	Dry bulk	Percentage	Fluid	Percentage
	1,000 tons	Percent	1,000 tons	Percent	1,000 tons	Percent
1967 .....	15,489.2	43	12,159.4	35	7,676.1	22
1968 .....	13,900.1	38	14,313.4	39	8,556.6	23
1969 .....	13,143.8	35	15,198.5	41	8,936.7	24
1970 .....	12,146.3	32	15,822.4	42	9,977.2	26
1971 .....	11,500.0	29	16,931.7	43	11,131.8	28
1972 .....	11,242.0	28	17,463.7	44	10,839.7	27
1973 .....	10,360.2	25	20,075.0	48	11,073.4	27
1974 .....	10,273.0	23	21,771.1	49	12,592.4	28
1975 .....	8,869.8	22	19,296.9	48	12,127.3	30
1976 .....	8,389.4	18	23,258.6	50	14,881.4	32

<sup>1</sup> Excludes Alaska, Hawaii, and Puerto Rico. <sup>2</sup> Includes all commercial fertilizer sold or shipped for farm and nonfarm use as fertilizer. Secondary and micronutrients applied directly to the soil are not included. Anhydrous ammonia is included in "Fluid."

Source: "Commercial Fertilizers, Consumption by Class For Year Ended June 30, 1976", USDA, SRS, SpCr 7 (77), and earlier issues.

## FERTILIZER USE ON CROPS-1976/77<sup>2</sup>

Fertilizer application rates presented a mixed picture in 1976/77. Application rates of nitrogen were up from last year on soybeans, corn, and wheat, but down on cotton (table 14). Application rates of P<sub>2</sub>O<sub>5</sub> were up on each of the four crops. Application rates for potash increased on corn and wheat, decreased on cotton, and remained the same as a year earlier for soybeans.

Application rates were probably influenced by regional shifts in crop plantings, especially cotton. Cotton acres increased most in those areas where rates of application of nitrogen or potash are less.

The substantial increase in cotton acres in Texas and Oklahoma tended to reduce the overall U.S. average for nitrogen from a year earlier, and these increased plantings, plus increased plantings in the West, also reduced the average application rate for potash.

<sup>2</sup>Every year since 1964, USDA's Statistical Reporting Service has collected information on fertilizer used on corn for grain, cotton, soybeans for beans, and wheat in the major producing States. Approximately 8,300 fields are surveyed in selected States with farmers reporting amounts of nitrogen, phosphate, and potash applied to fields in the survey along with the timing of applications.

Table 14—Estimates of fertilizers used on harvested acres of corn for grain, cotton, soybeans for beans, and all wheat, United States, 1973-1977

Crop and year	Acres receiving				Rates per acre receiving			Total U.S. harvested acreage 1,000 acres
	Any fertilizer	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	
		<i>Percent</i>			<i>Pounds</i>			
<b>Corn</b>								
1973 .....	94	93	86	80	114	64	71	61,894
1974 .....	94	94	87	83	103	62	73	65,357
1975 .....	94	94	86	82	105	58	67	66,905
1976 .....	97	97	90	84	127	67	78	70,955
1977 .....	96	96	88	82	128	68	82	69,553
<b>Cotton</b>								
1973 .....	75	74	55	39	73	53	62	11,970
1974 .....	79	79	58	46	78	53	55	12,567
1975 .....	65	65	43	33	78	50	55	8,796
1976 .....	76	75	53	37	81	52	56	10,914
1977 .....	79	78	51	31	78	53	52	13,192
<b>Soybeans</b>								
1973 .....	33	24	32	32	14	42	55	55,796
1974 .....	30	22	28	28	15	41	55	52,368
1975 .....	28	18	25	26	15	40	53	53,606
1976 .....	31	20	28	30	14	42	60	49,401
1977 .....	35	24	33	34	16	45	60	58,138
<b>All wheat</b>								
1973 .....	64	63	45	17	48	38	36	53,869
1974 .....	66	66	46	20	46	38	37	65,613
1975 .....	63	63	43	21	46	35	35	69,641
1976 .....	71	71	50	21	51	37	37	70,824
1977 .....	65	64	44	19	53	39	41	66,639

**Corn for grain:** The single largest use of fertilizer in the United States is for corn. Close to 69.5 million acres of corn were harvested in the United States in 1977. Fertilization on these acres required approximately 39 percent of the nitrogen, 36 percent of the P<sub>2</sub>O<sub>5</sub>, and 40 percent of the K<sub>2</sub>O used in the United States in 1976/77.

The 18 States surveyed for fertilizer use on corn accounted for 92 percent of total acreage of corn harvested for grain in the United States. Of the fields surveyed in 1977, 96 percent received some fertilizer, down slightly from 97 percent in 1976. Corn acreage receiving nitrogen in 1977 was down slightly to 96 percent and the proportions of acreage receiving P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O were also down.

In 1977, nitrogen was applied to corn for grain at the rate of 128 pounds per acre. This represented an increase of less than 2 percent from year earlier levels (table 15). The application rate of about 68 pounds for P<sub>2</sub>O<sub>5</sub> was up from 1976, while K<sub>2</sub>O use was up about 4 pounds per acre from 1976.

**Cotton:** The 12 cotton producing States surveyed accounted for 98 percent of total U.S. acreage harvested in 1977 (table 16). Of the fields surveyed, 79 percent received some fertilizer, up from the previous year. The proportion of cotton acreage receiving nitrogen in 1977 increased (table 14). The

percent of harvested acres receiving phosphate and potash declined from the previous year.

The amount of nitrogen applied to cotton in 1977 averaged 78 pounds per acre, a decline from 1976. Application rates for potash were also down, while phosphate use was up.

**Soybeans for beans:** The 16 States surveyed for fertilizer use on soybeans for beans in 1977 accounted for 93 percent of U.S. harvested soybean acreage (table 17). The percent of acres receiving fertilizer increased as did acreage receiving nitrogen, phosphate, and potash.

The application rate of nitrogen used on soybeans was up 2 pounds in 1977 to 16 pounds per acre. Phosphate use was up 3 pounds to 45 pounds per acre. Potash applications were the same as a year earlier at 60 pounds per acre.

**All wheat:** The 17 States surveyed for fertilizer use on wheat in 1977 accounted for 92 percent of total U.S. acreage harvested for wheat (table 18). Of the fields surveyed, 65 percent received some fertilizer, down from 71 percent in 1976. The proportion of acres receiving nitrogen decreased along with the proportions receiving phosphate and potassium. Application rates on acreage harvested for wheat in 1977 were up for nitrogen, phosphate, and potash.

Table 15—Fertilizer use on corn acreage harvested for grain, selected States, 1977

State	Acres for harvest <sup>1</sup>	Fields in survey	Acres receiving				Rate per acre receiving			Acres fertilized <sup>2</sup>		
			Any fertilizer	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	At or before seeding	After seeding	At or before and after seeding
	<i>1,000 acres</i>	<i>Number</i>	<i>Percent</i>				<i>Pounds</i>			<i>Percent</i>		
Pennsylvania . . .	1,150	125	98.4	98.4	97.6	96.8	104.4	72.0	56.4	84.5	0.0	15.5
Michigan . . . . .	2,050	97	99.0	99.0	95.9	97.9	103.2	63.8	79.3	49.0	1.0	50.0
Minnesota . . . . .	5,900	164	94.5	94.5	92.7	90.2	107.2	56.2	76.5	83.9	0.0	16.1
Wisconsin . . . . .	2,600	115	98.3	98.3	97.4	96.5	82.0	59.6	86.7	73.5	0.9	25.6
3 States . . . . .	10,550	376	96.3	96.3	94.4	93.3	100.2	58.5	79.6	74.3	0.4	25.3
Illinois . . . . .	10,900	203	98.5	97.5	96.1	96.6	130.4	83.3	99.3	79.0	0.0	21.0
Indiana . . . . .	6,200	176	100.0	99.4	98.9	96.0	139.5	84.4	103.1	67.6	0.0	32.4
Iowa . . . . .	12,200	209	98.1	98.1	90.4	88.5	128.2	63.6	73.2	85.4	2.9	11.7
Missouri . . . . .	2,700	160	95.0	94.4	81.9	80.6	133.5	61.1	69.4	80.3	4.6	15.1
Ohio . . . . .	3,750	136	97.8	97.8	97.8	94.9	129.6	89.6	100.2	72.2	0.8	27.0
5 States . . . . .	35,750	884	98.3	97.8	93.7	92.3	131.4	76.3	89.6	78.5	1.4	20.1
Kansas . . . . .	1,700	153	98.6	98.6	75.7	34.3	165.4	40.2	26.8	85.5	0.0	14.5
Nebraska . . . . .	6,350	170	95.7	95.7	65.8	37.4	135.7	39.8	20.3	66.6	4.5	28.9
South Dakota . . .	2,000	88	53.4	53.4	45.5	31.8	52.4	24.1	18.0	87.2	4.3	8.5
3 States . . . . .	10,050	411	87.7	87.7	63.4	35.8	131.1	37.6	21.0	72.6	3.7	23.7
Kentucky . . . . .	1,400	110	88.2	97.3	95.5	98.2	114.7	80.8	88.7	82.4	0.9	16.7
North Carolina . .	1,600	111	99.1	99.1	99.1	99.1	149.3	61.1	85.6	91.4	0.9	80.0
Virginia . . . . .	580	121	99.2	99.2	97.5	97.5	128.0	81.2	104.7	43.3	3.3	53.4
3 States . . . . .	3,580	342	98.8	98.4	97.4	98.5	132.7	71.8	89.8	47.3	1.3	51.4
Georgia . . . . .	1,100	94	100.0	100.0	100.0	100.0	149.1	60.6	99.0	7.5	3.2	89.3
Texas . . . . .	1,600	168	95.8	95.8	54.2	28.6	187.2	49.4	56.8	56.5	5.0	38.5
Colorado . . . . .	630	128	97.7	96.1	65.6	36.7	150.5	41.5	37.0	35.2	12.8	52.0
18 States . .	64,400	2,528	96.3	96.0	88.3	82.1	127.7	67.5	82.1	73.1	1.8	25.1

<sup>1</sup> "Crop Production" CrPr 2-2 (11-77) Crop Reporting Board, SRS, USDA, November 10, 1977. <sup>2</sup> Percentages apply to acres receiving fertilizer.

Table 16—Fertilizer use on cotton acreage harvested, selected States 1977

State	Acres for harvest <sup>1</sup>	Fields in survey	Acres receiving				Rate per acre receiving			Acres fertilized <sup>2</sup>		
			Any fertilizer	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	At or before seeding	After seeding	At or before and after seeding
	<i>1,000 acres</i>	<i>Number</i>	<i>Percent</i>				<i>Pounds</i>			<i>Percent</i>		
Missouri . . . . .	260	66	100.0	95.5	83.3	87.9	48.8	39.1	62.3	60.6	15.2	24.2
Tennessee . . . . .	310	98	99.0	95.9	91.8	91.8	68.2	66.5	68.5	83.5	10.3	6.2
Alabama . . . . .	400	110	100.0	99.1	90.9	97.3	73.6	72.2	84.8	73.7	2.7	23.6
Georgia . . . . .	190	66	100.0	100.0	100.0	100.0	108.8	67.3	109.7	10.6	0.0	89.4
South Carolina . .	160	78	100.0	100.0	93.6	98.7	125.1	64.9	110.4	9.0	1.3	89.7
3 States . . . . .	750	254	100.0	100.0	97.3	99.5	115.6	66.3	110.0	10.0	0.5	89.5
Arkansas . . . . .	970	255	98.0	95.3	75.3	78.4	66.0	47.5	60.3	73.2	3.6	23.2
Louisiana . . . . .	540	124	100.0	98.4	62.9	61.3	69.8	50.5	49.0	40.3	47.6	12.1
Mississippi . . . . .	1,360	351	100.0	99.4	42.5	44.2	98.2	57.1	57.0	66.7	7.4	25.9
3 States . . . . .	2,870	730	99.3	97.8	57.3	58.9	82.4	51.5	57.0	64.0	13.5	22.5
Oklahoma . . . . .	510	92	59.8	59.8	57.6	26.1	26.7	38.8	15.2	100.0	0.0	0.0
Texas . . . . .	6,300	673	59.3	59.3	45.4	15.3	44.8	47.3	13.8	83.7	11.5	4.8
2 States . . . . .	6,810	766	62.2	62.2	43.1	15.0	47.7	46.5	14.0	86.6	9.5	3.9
Arizona . . . . .	557	92	92.4	92.4	57.6	1.1	147.5	58.8	37.2	5.9	45.9	48.2
California . . . . .	1,390	273	95.4	94.8	46.9	10.4	141.5	75.4	49.7	39.0	28.3	32.7
12 States . .	12,947	2,279	78.5	77.9	51.2	30.5	78.0	53.1	52.1	66.3	14.5	19.2

<sup>1</sup> "Crop Production" CrPr 2-2 (11-77) Crop Reporting Board, SRS, USDA, November 10, 1977. <sup>2</sup> Percentages apply to acres receiving fertilizer.

Table 17—Fertilizer use on soybean acreage harvested for beans, selected States 1977

State	Acres for harvest <sup>1</sup>	Fields in survey	Acres receiving				Rate per acre receiving			Acres fertilized <sup>2</sup>		
			Any fertilizer	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	At or before seeding	After seeding	At or before and after seeding
	1,000 acres	Number	Percent				Pounds			Percent		
Minnesota . . . . .	3,810	94	10.6	6.4	8.5	10.6	10.4	33.8	56.3	100.0	0.0	0.0
Illinois . . . . .	8,850	167	26.3	15.6	23.4	26.3	15.7	46.5	67.0	100.0	0.0	0.0
Indiana . . . . .	3,870	110	56.4	46.4	53.6	54.5	10.5	37.4	51.5	96.8	3.2	0.0
Iowa . . . . .	7,200	155	14.8	11.0	14.8	14.8	13.5	39.2	48.8	95.6	0.0	4.4
Missouri . . . . .	4,780	143	16.1	8.4	15.4	16.1	12.5	40.9	59.5	95.6	4.4	0.0
Ohio . . . . .	3,380	107	52.3	41.1	52.3	52.3	12.3	41.5	47.0	96.4	2.1	0.5
5 States . . . . .	28,080	682	28.9	20.5	27.5	28.7	12.7	41.4	55.4	97.4	2.1	0.5
Kansas . . . . .	990	47	23.4	21.3	17.0	10.6	30.2	38.5	45.8	90.9	0.0	9.1
Nebraska . . . . .	1,280	64	10.9	10.9	10.9	7.8	24.7	44.2	19.6	85.7	0.0	14.3
2 States . . . . .	2,270	111	16.4	15.4	13.6	9.0	28.0	41.1	33.1	88.9	0.0	11.1
Kentucky . . . . .	1,360	70	71.4	64.3	71.4	71.4	20.2	49.7	55.8	100.0	0.0	0.0
North Carolina . . . . .	1,350	73	56.2	49.3	54.8	56.2	13.7	36.2	58.2	85.4	12.2	2.4
Tennessee . . . . .	2,220	85	67.1	48.2	62.4	65.9	18.4	50.4	55.1	100.0	0.0	0.0
3 States . . . . .	4,930	228	65.3	53.0	62.8	64.8	17.8	46.7	56.0	96.5	2.9	0.6
Georgia . . . . .	1,150	75	92.0	76.0	92.0	92.0	21.2	49.7	78.3	97.1	2.9	0.0
Alabama . . . . .	1,675	76	97.4	71.1	94.7	96.1	26.5	55.6	63.2	100.0	0.0	0.0
South Carolina . . . . .	1,310	72	79.2	61.1	77.8	79.2	14.8	43.4	84.1	98.2	1.8	0.0
3 States . . . . .	4,135	223	85.2	68.1	84.4	85.2	18.1	46.6	81.1	97.7	2.3	0.0
Arkansas . . . . .	4,600	151	39.1	17.9	35.1	35.8	28.1	39.6	54.2	98.3	1.7	0.0
Louisiana . . . . .	2,550	94	25.5	11.7	25.5	24.5	11.9	57.2	59.9	100.0	0.0	0.0
Mississippi . . . . .	3,850	127	40.9	16.5	39.4	40.2	22.2	55.3	68.0	100.0	0.0	0.0
3 States . . . . .	11,000	372	36.6	16.0	34.4	34.7	23.2	48.9	60.7	99.2	0.8	0.0
17 States . . . . .	54,225	1,710	34.7	23.6	32.9	33.8	16.4	44.5	59.5	97.5	1.9	0.6

<sup>1</sup>"Crop Production" CrPr 2-2 (11-77) Crop Reporting Board, SRS, USDA, November 10, 1977. <sup>2</sup>Percentages apply to acres receiving fertilizer.

Table 18—Fertilizer use on all wheat acreage harvested, selected States 1977

State	Acres for harvest <sup>1</sup>	Fields in survey	Acres receiving				Rate per acre receiving			Acres fertilized <sup>2</sup>		
			Any fertilizer	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	At or before seeding	After seeding	At or before and after seeding
	1,000 acres	Number	Percent				Pounds			Percent		
Michigan . . . . .	930	56	98.2	98.2	96.4	96.4	50.7	57.4	55.0	30.9	9.1	60.0
Minnesota . . . . .	3,307	77	90.9	90.9	85.7	71.4	63.0	35.8	23.4	94.3	4.3	1.4
2 States . . . . .	4,237	133	92.6	92.6	88.1	77.1	60.1	41.1	32.3	79.2	5.4	15.4
Illinois . . . . .	1,600	87	95.4	95.4	87.4	75.9	55.4	65.2	62.1	31.3	8.4	60.3
Indiana . . . . .	1,265	56	96.4	96.4	94.6	94.6	63.1	60.7	64.6	29.6	5.6	64.8
Missouri . . . . .	1,550	81	92.6	92.6	75.3	75.3	61.4	48.5	48.8	34.7	29.3	36.0
Ohio . . . . .	1,540	74	98.6	98.6	97.3	97.3	61.2	63.4	64.0	21.9	5.5	72.6
4 States . . . . .	5,955	298	95.7	95.7	88.3	85.3	60.1	60.0	60.2	29.3	12.3	58.4
Kansas . . . . .	12,300	289	71.6	71.3	40.8	8.3	49.1	33.9	21.3	77.3	7.3	15.4
Nebraska . . . . .	3,050	114	57.9	56.1	23.7	4.4	47.5	35.6	7.6	89.4	7.6	3.0
North Dakota . . . . .	9,530	240	51.2	47.5	6.7	32.6	27.6	14.9	99.2	0.0	0.0	0.8
South Dakota . . . . .	3,012	123	23.6	23.6	17.1	0.8	27.5	20.8	5.0	79.3	6.9	13.8
4 States . . . . .	27,892	766	58.0	57.6	38.7	6.5	43.0	30.7	17.8	85.3	5.1	9.6
Oklahoma . . . . .	6,500	176	73.3	73.3	48.3	17.6	56.6	36.9	17.2	69.0	14.7	16.3
Texas . . . . .	4,700	202	44.3	44.3	26.7	6.2	77.4	41.3	37.6	68.7	8.8	22.5
2 States . . . . .	11,200	378	61.1	61.1	39.3	12.8	62.9	38.1	21.3	68.9	12.9	18.2
Colorado . . . . .	2,390	76	9.2	9.2	0.0	0.0	58.1	0.0	0.0	100.0	0.0	0.0
Idaho . . . . .	1,190	110	77.3	77.3	12.7	1.8	83.6	34.3	35.4	64.7	21.2	14.1
Montana . . . . .	4,985	165	47.9	47.3	43.0	3.0	20.4	26.5	26.6	94.9	0.0	5.1
3 States . . . . .	8,565	351	41.3	40.9	26.9	2.0	39.4	27.0	27.7	87.4	5.5	7.1
Oregon . . . . .	1,145	86	84.9	83.7	19.8	4.7	72.2	44.7	37.5	74.0	9.6	16.4
Washington . . . . .	2,890	138	98.6	98.6	18.8	1.4	71.2	38.3	19.6	86.8	6.6	6.6
2 States . . . . .	4,035	224	94.6	94.3	19.1	2.4	71.5	40.2	29.7	83.5	7.4	9.1
17 States . . . . .	61,883	2,150	64.5	64.2	44.1	19.1	52.8	38.9	40.7	73.8	7.8	18.4

<sup>1</sup>"Crop Production" CrPr 2-2 (9-77) Crop Reporting Board, SRS, USDA, September 12, 1977. <sup>2</sup>Percentages apply to acres receiving fertilizer.

## U.S. IMPORT-EXPORT REVIEW

*Nitrogenous fertilizers:* Net U.S. imports of nitrogen in 1976/77 rose to an estimated 600,000 tons as export shipments dropped and imports increased from the previous year. The total declared export value for the three major nitrogen exports—anhydrous ammonia, urea, and ammonium sulfate—dropped by 35 percent to \$77.2 million (table 19). Export tonnages of anhydrous ammonia increased over 14 percent, but exports of urea and ammonium sulfate each dropped by over one-third (table 20).

**Table 19—Fertilizer exports: Declared values of specified fertilizers exported from the United States, years ended June 30, 1974-77**

Material	1974	1975	1976	1977 <sup>1</sup>
<i>Million dollars</i>				
Anhydrous ammonia fertilizer . . . . .	37.1	61.0	21.6	29.5
Urea . . . . .	32.7	130.0	66.8	29.1
Ammonium nitrate . . . . .	4.0	3.5	5.3	1.5
Ammonium sulfate . . . . .	20.5	52.2	30.9	18.6
Sodium nitrate . . . . .	.1	.3	.1	.1
Nitrogenous chemical fertilizer . . . . .	2.5	3.8	3.1	4.6
Phosphate rock (Florida pebble) . . . . .	159.3	371.1	420.8	319.9
Normal super-phosphate . . . . .	.7	.8	.8	.2
Concentrated super-phosphate . . . . .	93.7	270.4	139.5	98.4
Ammonium phosphates . . . . .	228.4	544.8	412.6	334.1
Phosphoric acid (fertilizer grade) . . . . .	7.9	41.9	68.7	89.8
Phosphoric acid NEC . . . . .	6.2	16.3	14.3	11.4
Phosphatic chemical fertilizer . . . . .	4.3	4.7	5.0	5.3
Potassium chloride . . . . .	47.3	56.4	70.6	63.1
Potassium sulfate . . . . .	12.5	22.9	23.5	24.5
Mixed fertilizer NEC . . . . .	42.1	60.6	30.1	27.7
Total . . . . .	699.3	1,640.7	1,313.8	1,057.9

<sup>1</sup> Preliminary.

Source: U.S. Exports, Schedule B-Commodity and Country, Report FT 410, U.S. Bureau of Census, published monthly.

Three major importers—Mexico, Trinidad-Tobago, and Brazil—received 65 percent of total U.S. exports of anhydrous ammonia in 1976/77. The top three importers of U.S. urea—Mexico, Brazil, and India—took 66 percent of urea exports. Four countries—Mexico, El Salvador, Dominican Republic, and Brazil—took 84 percent of total U.S. exports of ammonium sulfate.

Nitrogen imports increased in 1976/77. Import tonnages of anhydrous ammonia were up 26 percent, while imports of urea and nitrogen solutions were more than double year-earlier tonnages (table-

**Table 20—U.S. exports of specified fertilizer materials, years ended June 30, 1974-77**

Material	1974	1975	1976	1977 <sup>1</sup>
<i>1,000 tons</i>				
Anhydrous ammonia . . . . .	532	259	254	291
Urea . . . . .	323	450	581	368
Ammonium nitrate . . . . .	37	22	61	11
Ammonium sulfate . . . . .	557	560	752	491
Nitrogenous chemical, n.e.c. . . . .	29	34	22	42
Phosphate rock . . . . .	14,051	13,393	11,748	12,758
Normal super-phosphate . . . . .	25	21	22	7
Concentrated super-phosphate . . . . .	957	1,109	1,225	1,242
Ammonium phosphates . . . . .	2,154	2,242	2,721	3,150
Potassium chloride . . . . .	1,264	1,015	1,188	1,296
Potassium sulfate . . . . .	272	350	333	350
Mixed fertilizer . . . . .	437	497	218	224
Phosphoric acid, fertilizer grade . . . . .	<sup>2</sup> 44	205	311	445
Phosphorous chemical fertilizer, n.e.c. . . . .	55	42	60	45

<sup>1</sup> Preliminary. <sup>2</sup> Total for 6 months.

Source: U.S. Exports, Schedule B-Commodity and Country, Report FT 410 U.S. Bureau of Census, published monthly.

21). Imports of ammonium nitrates and ammonium sulfate were up 18 and 8 percent, respectively.

Canada was the most important source of U.S. anhydrous ammonia imports. Imports of anhydrous ammonia from Canada in 1976/77 increased over 270 percent to about 490,000 tons or about 50 percent of U.S. imports. Other important sources—Netherlands Antilles, Venezuela, Trinidad-Tobago,

**Table 21—U.S. imports of specified fertilizer materials, years ended June 30, 1974-77**

Fertilizer	1974	1975	1976	1977 <sup>1</sup>
<i>1,000 tons</i>				
Anhydrous ammonia . . . . .	438	598	767	968
Urea . . . . .	668	812	528	1,466
Nitrogen solutions . . . . .	166	92	188	445
Ammonium nitrate . . . . .	301	316	295	347
Ammonium-nitrate-limestone . . . . .	209	190	22	61
Ammonium sulfate . . . . .	273	248	420	454
Sodium nitrate . . . . .	100	202	89	139
Calcium nitrate . . . . .	185	116	72	68
Other nitrogen fertilizer . . . . .	213	109	129	114
Phosphate, crude . . . . .	164	80	36	57
Ammonium phosphates . . . . .	397	247	340	387
Potassium chloride . . . . .	6,766	6,359	6,466	8,211
Potassium sulfate . . . . .	74	51	63	93
Potassium sodium nitrate . . . . .	47	16	39	46
Potassic, n.s.p.f. . . . .	6	2	3	1

<sup>1</sup> Preliminary.

Source: U.S. Imports-Commodity and Country, Report FT 135, U.S. Bureau of Census, published monthly.

and the Netherlands—accounted for another 330,000 tons. These countries plus Canada provided 85 percent of shipments into the United States in 1976/77.

Imports of urea came primarily from the Netherlands and Canada. Together these countries provided over 1.0 million tons of urea or about two-thirds of urea imports. Trinidad-Tobago, the Federal Republic of Germany, and Italy provided another 280,000 tons or close to 20 percent of total urea imports.

**Phosphatic fertilizers:** The United States continued to be a major supplier of phosphate fertilizers. In 1976/77, the United States exported about 2.5 million tons of P<sub>2</sub>O<sub>5</sub> in various phosphate materials, amounting to roughly 30 percent of total U.S. production. In 1976/77, the United States was a net exporter of P<sub>2</sub>O<sub>5</sub> by over 2.2 million tons.

Brazil continued to be one of the top importers of diammonium phosphates in 1976/77, taking about 407,000 tons. Italy, Belgium-Luxembourg, and France were the next major importers and, together with Brazil, they received about 44 percent of U.S. exports of diammonium phosphates. India, a major importer in 1975/76, imported only 33,000 tons in 1976/77. Turkey, which did not import diammonium phosphate in 1975/76, imported over 225,000 tons of diammonium phosphate in 1976/77.

Twelve nations each imported 20,000 tons or more of concentrated superphosphate from U.S. sources in 1976/77. The top three importing nations—Brazil, Hungary, and France—received about one-half of total U.S. exports. Bangladesh, one of the top importers in 1975/76, did not import any U.S. concentrated superphosphate in 1976/77.

**Phosphate rock:** Encouraged by lower prices, other countries imported about 12.8 million tons of U.S. phosphate rock in 1976/77, up over 8 percent from a year earlier. Exports in 1976/77 to Canada, Mexico, Brazil, and Japan totaled over 4.6 million tons or 40 percent of U.S. exports of phosphate

rock. In 1975/76, these countries took about 5.0 million tons. Exports to the Netherlands, Belgium-Luxembourg, France, Federal Republic of Germany, and Poland countries increased 35 percent to over 4.3 million tons, accounting for about 34 percent of U.S. exports of phosphate rock.

**Potassium fertilizer:** A sharp increase in U.S. imports of potassium chloride occurred in 1976/77. Imports were up 27 percent to 8.2 million tons. Ninety-seven percent of U.S. imports were supplied by Canada, the same proportion as a year earlier. In 1976/77 the United States was a net importer of K<sub>2</sub>O by 4.0 million tons.

**AID-Financed Fertilizer Purchases:** During the fertilizer year which ended June 30, 1977, the U.S. Agency for International Development (AID) financed the purchase by developing countries of over 210,000 metric tons of fertilizer products valued at nearly 26.9 million dollars (table 22). These figures indicate both the lowest tonnages and lowest values of AID-financed fertilizer purchases in recent years. Quantities of products financed by AID declined by 50 percent between 1975/76 and 1976/77 and by 57 percent from 1974/75 to 1976/77. Values of those products declined 52 percent between 1975/76 and 1976/77 and 84 percent between 1974/75 and 1976/77.

The decline in value since 1974/75 is attributed both to decreased volume and to the sharp decline in prices since that record high year. Quantity decreases are partially due to the more favorable prices and purchase arrangements offered by other countries and to the diminished necessity for concessional fertilizer purchases. Since world market prices have fallen from their high 1974/75 levels, recipients of U.S. bilateral assistance have elected to spend their AID dollars on more urgent needs. Political changes have also affected AID fertilizer programs. For example, Vietnam received over 265,000 metric tons of fertilizer under AID auspices in 1974/75, over half of total tonnage financed that year. Quantities and values of AID fertilizer com-

Table 22—U.S. Agency for International Development Commitments to Finance Fertilizer Purchases by Developing Countries for years ended June 30, 1975-77

Fertilizer	1975		1976		1977	
	Quantity	Amount	Quantity	Amount	Quantity	Amount
	<i>1,000 metric tons</i>	<i>1,000 dollars</i>	<i>1,000 metric tons</i>	<i>1,000 dollars</i>	<i>1,000 metric tons</i>	<i>1,000 dollars</i>
Ammonium sulfate . . . . .	---	---	2.0	137.4	---	---
Diammonium phosphate . . . . .	73.2	28,384.8	202.3	27,313.9	174.9	22,182.2
Urea . . . . .	322.9	114,287.1	94.7	15,118.5	32.1	4,165.0
Concentrated superphosphate . . . . .	80.9	25,320.9	111.5	11,943.6	.5	55.0
Potassium chloride . . . . .	---	---	---	---	.1	17.6
Mixed fertilizer . . . . .	10.5	2,782.5	13.8	1,720.2	2.6	448.3
Total . . . . .	487.5	170,775.3	424.3	56,233.6	210.2	26,868.1

Source: U.S. Dept. of State, Agency for International Development.

mitments are expected to increase significantly in 1977/78, although the number of recipient countries will be reduced.

Fertilizers of non-U.S. origin comprised about two-thirds of AID-sponsored purchases in 1974/75 when domestic supplies were short. However, only 4 percent of AID fertilizers were of non-U.S. origin

in 1975/76 and only 15 percent in 1976/77. AID-financed exports of fertilizers of domestic origin represent a small proportion of total U.S. exports of similar materials. AID-sponsored tonnages accounted for 5 percent of U.S. exports in 1974/75, 9 percent in 1975/76, and only 3 percent in 1976/77.

## WORLD FERTILIZER SITUATION REVIEW AND PROSPECTS

World fertilizer consumption in 1975/76 reached a new record level of 88.7 million metric tons of plant nutrients (N, P<sub>2</sub>O<sub>5</sub>, and K<sub>2</sub>O), following a decline of about 3 percent in 1974/75. That decline had been the first experienced in over 30 years and can largely be attributed to consumer resistance to record high prices. The 1975/76 record represented nearly a 10-percent increase in consumption over 1974/75 levels and was about 6 percent higher than the previous record of 1973/74.

Preliminary estimates for 1976/77 indicate that total world fertilizer consumption reached nearly 96 million metric tons of nutrients, an increase of about 8 percent over 1975/76 and another record high. Improved rainfall in Western Europe and record high levels of fertilizer use in the United States were important factors contributing to increased world consumption totals in 1976/77. Fertilizer use in developing countries also increased. India, for example, expanded consumption in 1976/77 by nearly 18 percent over the previous year and Brazil's consumption may have grown about 13 percent in 1977.

The trend of increasing world fertilizer supply availability continued through the 1976/77 fertilizer year and persists at present. International prices for most products reached the bottom of their downward plunge early in 1976/77, (Figure 2). Moderate upward price movement was experienced for most products in 1977 with the exception of potassium chloride which suffered from excess supplies. However, international fertilizer prices have weakened in recent months. World-wide grain surpluses and a sluggish fall fertilizer season in the United States have contributed to diminished current demand for fertilizers. Farmers in the United States have elected to cut down on their usual fall fertilization owing to untimely weather conditions and uncertainty over the effects of acreage set-aside programs for wheat and feed-grains.

It is too early to predict whether the current price "pause" will persist into the normally brisk

spring fertilizer season. However, scheduled additions to already excess production capacities coupled with the uncertainty of demand in the very important North American market should ease upward price pressures in the 1977/78 fertilizer year.

### Nitrogen

The principal features in the world nitrogen fertilizer market include expanding demand (estimated at 45.9 million metric tons in 1976/77 and 49.6 million metric tons in 1977/78), even more rapidly expanding production capacities, and new international nitrogen trade patterns.

Massive expansions of nitrogen fertilizer production facilities are scheduled for 1977/78 which are expected to add about 10 million metric tons per year of additional urea capacity and 9 million tons of new ammonia capacity. The People's Republic of China alone is aiming at adding 5 million metric tons of urea capacity this year, and other large increases are slated for India and North America.

In 1976/77 South Korea and Indonesia became new export suppliers of ammonia to East Asia, while Japan's urea exports slumped to below 1 million metric tons for the first time in over 10 years. The United States imported large tonnages of urea from Western Europe in the wake of U.S. natural gas curtailments, and it is expected that large amounts of urea and ammonia will be imported from Canada in 1977/78 following heavy capacity expansions there. China, Pakistan, India, Brazil, and Iran are expected to satisfy more of their nitrogen needs from expanded domestic production in 1977/78, thus diminishing import demands. Meanwhile, Libya, Mexico, the Soviet Union, and Canada are expected to add to world ammonia supplies offered for export.

### Phosphate Rock and Phosphate Fertilizer

Demand for phosphate fertilizers is also expanding; estimates for 1976/77 peg demand at about

26.3 million metric tons of nutrient and projections indicate a level of 28.2 million metric tons for 1977/78. Expansion of demand for phosphate rock is estimated at 10 percent for calendar year 1977.

The world trade arena for phosphate rock in calendar year 1977 witnessed the attempted formation of an Afro-Arab exporting consortium including Morocco, Tunisia, Jordan, and Senegal. However, thus far, this attempt has been unsuccessful. Morocco has worked on diversifying its markets with expanded exports to Latin America and the first exports of rock to the United States this year. The United States, however, has replaced Morocco as the major supplier of rock to Poland, and sales of Florida rock to both Eastern and Western Europe have grown.

South Africa has become a strong competitor of the United States in the large Brazilian phosphoric acid market. The importance of acid trade is growing rapidly, the volume of exports, for example, expanded by 185 percent between 1972 and 1975. France and Japan imposed restrictions upon imports of U.S. finished phosphate products in 1977.

### Potash

Preliminary estimates of 1976/77 world potash demand vary, but indications are that demand increased by at least 6 percent and possibly as much as 11 percent. The consensus is that demand should continue to grow in 1977/78 and that export expansion is assured. North American potash exports climbed by nearly 12 percent in 1976/77 and may expand even further in 1977/78 since there are indications of increased import requirements in Brazil, India, Japan, and Southeast Asia. North American potash exports during the first quarter of 1977/78 (July-September 1977) were considerably ahead of the same period in 1976/77.

The Saskatchewan Provincial government's Potash Corporation of Saskatchewan took control of its third mine on November 1, 1977, giving it ownership of about a quarter of Saskatchewan's production capacity. PCS is actively studying the possible acquisition of additional production facilities and has announced plans to expand existing facilities. These actions would bring PCS closer to its goal of owning 50 percent of the Province's potash production capacity.

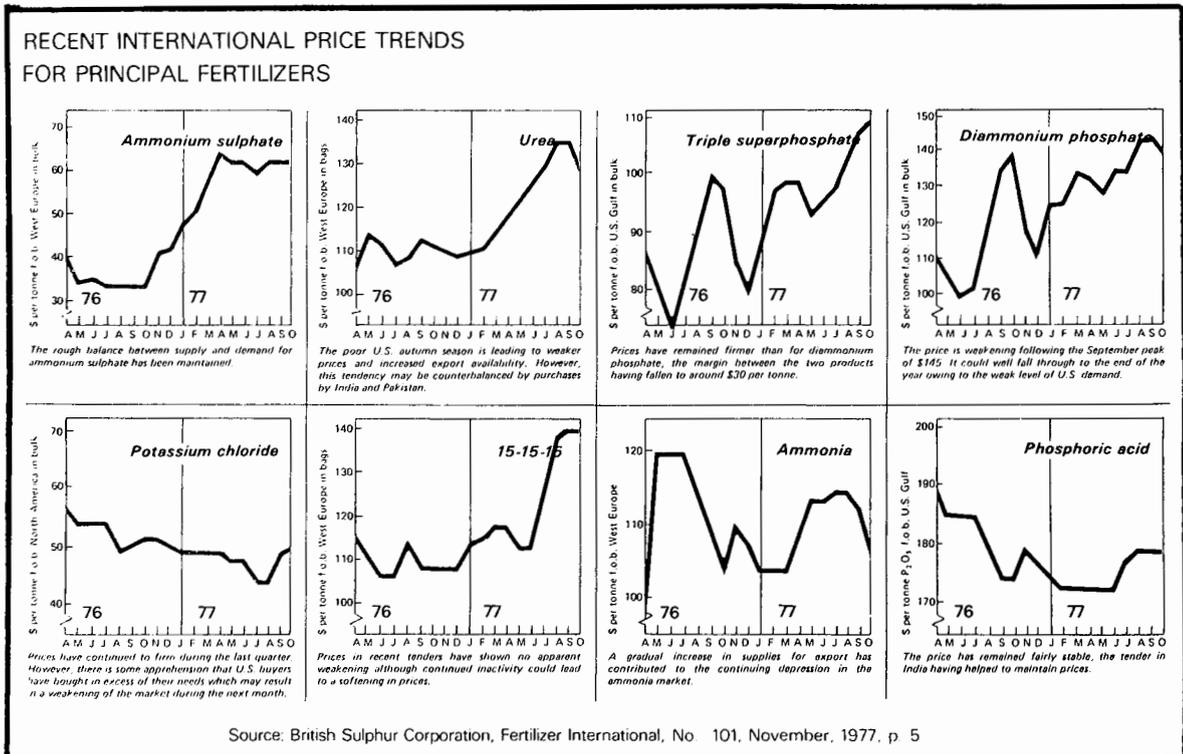


Figure 2

## SUPPLY AND DEMAND PROJECTIONS TO 1981/82<sup>3</sup>

### Nitrogen Fertilizers

World consumption of nitrogen fertilizers for 1976/77 was an estimated 45.9 million metric tons of nutrient, a 6-percent increase over 1975/76 (table 23). A further 8-percent increase in worldwide demand is projected for 1977/78. Demand for nitrogen fertilizers is forecast to grow about 6.5 percent per year through 1981/82, reaching a level of about 63 million metric tons by then.

In 1976/77, developed market economies accounted for about 44 percent of nitrogen fertilizer use, with centrally planned economies accounting for about 37 percent and developing countries only 19 percent. However, by 1981/82, developing countries are expected to consume about 23 percent of the world's nitrogen fertilizers, while the developed market economies' share will decline to about 39 percent. This change is expected due to the higher growth rate for nitrogen demand in developing countries. Between 1975/76 and 1981/82, demand for nitrogen fertilizers is expected to grow by 89 percent in the developing countries, 45 percent in the Communist nations, and only 28 percent in the developed Western world.

<sup>3</sup>Supply/demand projections to 1981/82 for nitrogenous, phosphatic, and potash fertilizers are based upon the forecasts prepared by the FAO/UNIDO/World Bank Working Group on Fertilizers in June 1977. Their report is presented in an FAO document entitled *Current Situation and Outlook* presented to the Fourth Session of the Commission on Fertilizers, Rome, September 27-30, 1977.

World supplies of nitrogen fertilizers are forecast to more than adequately meet demand through 1981/82. World supply capability, estimated at 46 million metric tons in 1976/77, is expected to reach 67.5 million metric tons by 1981/82, an increase of about 47 percent. About a third of the expected increase will take place in developing countries—particularly in Mexico, Trinidad-Tobago, Venezuela, South Korea, Indonesia, and the Middle East. About 45 percent of the expansion will take place in the centrally planned states, especially in the Soviet Union. Only a fifth of the world's nitrogen supply increase is expected in the western developed countries.

The projected 151-percent expansion in supply capability in the developing countries between 1975/76 and 1981/82 will increase their 14-percent share of world nitrogen fertilizer production in 1975/76 to 20 percent in 1981/82. The developed countries' share is expected to fall from 49 percent to 39 percent during the same period, while the centrally planned economies increase their portion from 38 percent to 41 percent.

The worldwide surplus supply capability relative to demand for nitrogen is expected to grow from less than 0.2 million metric tons in 1976/77 to nearly 4.4 million metric tons in 1981/82. This excess capacity should prevent a return to tight supply situations before 1982, although producers with high feedstock costs such as Japan may elect to close down existing facilities rather than sell at low prices.

Table 23—Estimates of World Fertilizer Supply Capability<sup>1</sup> Demand<sup>2</sup> and Balance 1975/76 to 1981/82  
(Million metric tons of nutrient)

	Reported 1975/76	Estimated 1976/77	Forecast				
			1977/78	1978/79	1979/80	1980/81	1981/82
<b>Nitrogen — N</b>							
Supply . . . . .	43.87	46.01	51.01	55.36	59.51	63.74	67.45
Demand . . . . .	43.30	45.85	49.57	52.54	55.88	59.53	63.09
Balance . . . . .	.57	0.16	1.44	2.82	3.63	4.21	4.36
<b>Phosphate — P<sub>2</sub>O<sub>5</sub></b>							
Supply . . . . .	24.87	30.53	31.95	32.69	33.65	35.52	37.03
Demand . . . . .	24.04	26.28	28.19	29.96	31.89	33.48	35.13
Balance . . . . .	.83	4.25	3.76	2.73	1.76	2.04	1.90
<b>Potash — K<sub>2</sub>O</b>							
Supply . . . . .	23.47	26.37	27.49	28.87	29.98	31.01	32.50
Demand . . . . .	21.33	23.76	24.95	25.95	27.14	28.32	29.64
Balance . . . . .	2.14	2.61	2.54	2.92	2.84	2.69	2.86

<sup>1</sup> Supply figures are derived by reducing estimated production potential to reflect nonfertilizer uses and losses in processing, storage, handling and transportation. <sup>2</sup> Demand figures reflect absorptive capacities of the nations of the world taking foreign exchange availabilities into account and assuming that prices will remain between the low levels of 1971/72 and the peaks of 1973/74.

Source: FAO. *Current Situation and Outlook*, FERT/77/3 — August 1977, Commission on Fertilizers, Fourth Session, Rome, September 27-30, 1977. Based upon estimates by the FAO/UNIDO/World Bank Working Group on Fertilizers, June 1977.

At the same time that the Soviet Union and other countries are building up their export capacities, markets for those exports are diminishing. In 1975/76 developing countries supplied about 69 percent of their own nitrogen needs. By 1981/82 they are expected to supply 92 percent. The import requirements of the developing countries are expected to be cut in half from 1975/76 levels of 2.3 million metric tons to only 1.1 million tons in 1981/82. Another large importer of nitrogen, the People's Republic of China, is moving toward self-sufficiency by planning the construction of 13 modern imported ammonia-urea plants. In the face of these supply conditions, it is highly unlikely that world nitrogen fertilizer prices will increase by immoderate rates prior to 1982.

### Phosphate Fertilizers

World consumption of phosphate fertilizers in 1976/77 is estimated at 26.3 million metric tons of  $P_2O_5$  nutrient, a 9-percent increase over 1975/76. A further increase of 7 percent is forecast for 1977/78 and the short term growth rate to 1981/82 is estimated at 6.5 percent per year, leading to world demand of 35.1 million metric tons of phosphate fertilizer in 4 years.

Demand is expected to grow fastest in the developing countries where it is forecast to increase by 87 percent between 1975/76 and 1981/82, while rates of 56 percent and 27 percent are projected for the centrally planned economies and developed market economies, respectively. These contrasting rates of growth are expected to shift the proportions of world demand generated by the various economic groupings. In 1975/76 the developed market economies, the developing market economies, and the centrally planned economies accounted for 51 percent, 15 percent, and 34 percent, respectively, of world phosphate demand. According to the forecast, by 1981/82 the developed countries' share will drop to 44 percent, the developing countries will increase their portion of world demand to 20 percent, and the centrally planned nations will increase their share to 36 percent.

Similar changes are forecast for phosphate supplies by 1981/82. Between 1976/77 and 1977/78, the total world phosphate supply is expected to rise from 30.5 million metric tons to nearly 32 million metric tons, a 5-percent increase. By 1981/82 the world supply of phosphate could reach 37 million metric tons, a 21-percent jump from 1976/77. As in the case of nitrogen, the developing countries will experience the most rapid rate of growth in phosphate supply capability. By 1981/82 they will increase that capability by 181 percent over 1975/76 levels. In contrast, the growth over the same period will be only 37 percent and 31 percent in the developed market economies and the cen-

trally planned economies, respectively. Again, paralleling the nitrogen situation, the developing countries will increase their share of world supply capability relative to developed and centrally planned regions. In 1975/76 developing countries enjoyed only 10 percent of the world's phosphate supply capability, a proportion that is expected to increase to 18 percent by 1981/82. Conversely, the shares of the developed market economy and the centrally planned economies are expected to fall from 57 and 33 percent in 1975/76 to 52 and 29 percent, respectively, by 1981/82.

The contrasting growth patterns will be even more pronounced for phosphoric acid supply. In 1975/76 phosphoric acid comprised about 53 percent of total world phosphate fertilizer supply capability. In 1976/77 this proportion increased to 60 percent and, by 1981/82, phosphoric acid is expected to account for 66 percent of total phosphates. By 1981/82 phosphoric acid supply capability in the developing nations will more than double and their share of world supply capability will grow from 12 percent in 1975/76 to 23 percent. Developing countries' supply capability for phosphoric acid could actually surpass centrally planned acid capability whose share is forecast to be only 20 percent of the world total by 1981/82. Developed market economies will lose percentage points also, falling from 64 percent of world supply in 1975/76 to 57 percent in 1981/82.

The principal additions to phosphate supply capability during the 1975/76 to 1981/82 period are expected to take place in the Middle East, North Africa, West Africa, the Union of South Africa, Brazil, the United States, and the Soviet Union. These expansions are due to take place in areas which are phosphate rock producers and may bode ill for phosphate fertilizer manufacturers in Western Europe and Japan who are dependent upon more costly imported phosphate rock. The impressive recent growth in phosphoric acid trade may suggest that the future of phosphate fertilizer manufacturing in such rock importing areas may be based upon finishing of intermediate products rather than processing of raw materials.

World trade patterns for phosphates are destined for change in other ways as well if the projections of the FAO/UNIDO/World Bank Working Group are realized. The import demand of the developing countries—1.2 million metric tons in 1975/76—as a group is expected to virtually disappear by 1981/82. In 1975/76 the indigenous supply of phosphate fertilizers in the developing market economies could satisfy 66 percent of their demand. By 1981/82 it is expected that 99 percent of their aggregate demand could be satisfied by developing country supplies. Import demand in the subregions, especially in Latin America and the Far East, will continue to grow but it could be satisfied by the

exports of other developing countries, particularly in Africa.

On the other hand, the negligible import needs of the centrally planned economies as a group in 1975/76 will grow to over 2 million metric tons by 1981/82. In 1975/76 the centrally planned economies produced 101 percent of the phosphates they needed. By 1981/82 that percentage is forecast to fall to 84. Total world import requirements will grow by about 66 percent between 1975/76 and 1981/82.

As in the case of nitrogen, a surplus supply capability for phosphates relative to world demand will continue through 1981/82. However, unlike the nitrogen surplus, phosphate surplus capability will decline through 1981/82. It appears likely that the surplus capability peaked in 1976/77 at 4.3 million metric tons and will decline to 1.9 million metric tons by 1981/82. The surplus capability that does exist should act as a cushion against rapid escalation of phosphate prices before 1981/82, but it will be necessary to plan now for additional investments in phosphate capacity in order to avoid tight supplies later. Demand for phosphate fertilizers is projected to reach nearly 42 million metric tons by 1985/86, and investment decisions must be made many years ahead of that date to insure adequate supplies.

#### Phosphate Rock<sup>4</sup>

Worldwide production of phosphate rock in 1976/77 totaled an estimated 136 million metric tons, an increase of about 27 percent over 1975/76. Production in 1977/78 is projected to be nearly 147 million metric tons, an 8-percent increase over the previous year. By 1980/81 it is expected that world phosphate rock production will reach 172.5 million metric tons, 27 percent higher than in 1976/77 and 61 percent higher than in 1975/76.

The Western world is projected to have an increase of 61 percent in production potential during the same period. In Northwest Africa the expansion will be 46 percent (19 percent of the world increase), in the United States 54-percent increase (35 percent of the world increase), in the USSR 38 percent (13 percent of the world increase), and in the near East a 222-percent expansion (13 percent of the world increase). Compared with projected demand for phosphate rock derived from fertilizer consumption forecasts, the potential world phosphate rock supply in 1979/80 should exceed demand by more than 8 million metric tons ( $P_2O_5$ ).

<sup>4</sup>Phosphate rock projections are based upon a review presented by Pierre L. Louis of the International Superphosphate Manufacturers Association (ISMA) at the 1977 ISMA Conference in Copenhagen as reported in British Sulphur Corp., *Fertilizer International*, No. 97, July 1977.

In 1981/82 the potential surplus could be as high as 10 million metric tons ( $P_2O_5$ ).

#### Potash Fertilizers

Preliminary estimates of worldwide consumption of potash fertilizers show that as much as 23.8 million metric tons of  $K_2O$  nutrients were consumed in 1976/77, an 11-percent increase over 1975/76 totals. Demand is expected to increase further in 1977/78 to almost 25 million metric tons, an increase of about 5 percent. By 1981/82 demand is expected to increase to 29.6 million metric tons, an increase of 39 percent over 1975/76 levels. In contrast to demand patterns for nitrogenous and phosphatic fertilizers demand growth rates for potash among developed, developing and centrally planned economies are similar. The demand growth in the developing countries is expected to be only slightly higher than that in the developed market economies and centrally planned economies. In 1975/76 developed countries consumed 49 percent of the world's potash, the centrally planned economies 42 percent, and the developing economies only 9 percent. By 1981/82 the developing countries' share is expected to grow to 12 percent, with developed market economies and centrally planned economies consuming 47 percent and 41 percent, respectively.

World supply capability for potash fertilizer is estimated at 26.4 million metric tons in 1976/77, an increase of 12 percent over 1975/76. World potash supply should grow another 4 percent in 1977/78 reaching an estimated 27.5 million metric tons. By 1981/82 world supply capability will expand to 32.5 million metric tons, a 38-percent growth over 1975/76 supplies.

Scant change is expected in the relative proportions of supply capabilities among the world's economic systems prior to 1981/82. In 1975/76 supply capabilities for potash were 51 percent for the developed market economies, 48 percent for the centrally planned economies, and only 1 percent for the developing countries. These proportions are not projected to change in 1981/82, although the 1977 flooding and closure of the Holle-St. Paul mine in the Congo Republic will reduce the developing countries' share even further. The planned Jordan Potash Works on the Dead Sea will probably not begin producing before 1983.

Most of the potash production capacity expansion is scheduled in the Soviet Union and Canada. The Potash Corporation of Saskatchewan is planning a two-phase expansion program which will add over 1 million short tons of potash capacity to existing mines. Furthermore, the Potash Corporation of America has recently announced the signing of an agreement with the New Brunswick government to develop a new mine with a capacity

of 1 million short tons per year in that Province. This mine may begin operations by 1981.

Potash supplies will be more than adequate to meet demand through 1981/82, with a consistent supply capability surplus of between 2.5 and 2.9 million metric tons. Little change is foreseen in traditional trading patterns in which six nations export about 90 percent of the world's potash.

The likely situation for potash through 1981/82 will be steady, moderate growth in supply and demand with continued excess capacity and traditional trading patterns.

### World Fertilizer Production Capacity

While production capacity data cannot be utilized in lieu of actual supply capability data, they are useful in making first determinations of expected supply changes. Production capacity data reveal only the manufacturers' rated nameplate capacities of installed equipment. They do not indicate actual supply capabilities until adjustments are made for known start-up and installation delays; maintenance conditions; energy supply reliability; technical losses in processing, storage, handling, and transportation; non-fertilizer uses; operation rates; and number of annual production days.

In 1975/76 total world nitrogen, phosphate, and potash production capacity (expressed as N equivalent for anhydrous ammonia capacity, P<sub>2</sub>O<sub>5</sub> equivalent for phosphoric acid capacity, and K<sub>2</sub>O equivalent for marketable potash) was 123.2 million metric tons (table 24). This total grew to 133.7 million metric tons in 1976/77, a 9-percent

increase, and is expected to reach 145 million metric tons in 1977/78, an 8-percent increase. By 1981/82 total world fertilizer capacity is predicted to reach 177.6 million metric tons, an increase of 44 percent over 1975/76 capacity. Of the 54.4 million metric tons of increased capacity expected between 1975/76 and 1981/82, 38.1 million metric tons or 70 percent will be in nitrogen, 10.2 million metric tons or 19 percent in phosphates, and 6.1 million metric tons or 11 percent in potash.

Developing countries will construct an additional 12.3 million metric tons of nitrogen capacity by 1981/82 (32 percent of the total world nitrogen increase), the centrally planned economies will augment their nitrogen production facilities by 17.5 million metric tons (46 percent of the total world increase), and the developed market economies will add 8.3 million metric tons (22 percent of the total world increase).

Phosphate capacity additions will be greatest among the developing market economies which will add 5.4 million metric tons of capacity by 1981/82 (52 percent of world total). Centrally planned nations will increase their capacity by 2.2 million metric tons (21 percent of world total), and the developed market economies are expected to add 2.6 million metric tons (26 percent of world total).

Potash production capacity is predicted to increase by 1.2 million metric tons in the developed market economies by 1981/82 and 4.8 million metric tons in the centrally planned economies. Respectively they account for one-fifth and four-fifths of the projected world increases in potash production by 1981/82 since the developing nations are expected to experience virtually no expansion.

Table 24—Estimates of World Fertilizer Production Capacity<sup>1</sup> 1975/76 to 1981/82  
(Million metric tons of nutrient)

Regions	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82
Nitrogen							
Developed Market Economies .....	34.60	37.31	39.28	41.42	42.25	42.61	42.94
Developing Market Economies .....	9.23	11.32	14.50	16.47	18.98	21.28	21.53
Centrally Planned Economies .....	26.03	28.77	33.09	35.22	38.18	39.80	43.50
Total World .....	69.86	77.40	86.87	93.11	99.41	103.69	107.97
Phosphate							
Developed Market Economies .....	15.28	16.77	17.10	17.29	17.68	17.91	17.91
Developing Market Economies .....	3.61	4.59	4.67	5.08	6.20	8.67	9.00
Centrally Planned Economies .....	4.35	4.60	4.80	4.91	5.20	6.19	6.52
Total World .....	23.24	25.96	26.57	27.28	29.08	32.77	33.43
Potash							
Developed Market Economies .....	17.55	17.60	17.88	18.25	18.52	18.61	18.75
Developing Market Economies .....	.33	.33	.33	.33	.33	.33	.38
Centrally Planned Economies .....	12.25	12.42	13.34	14.46	15.38	16.40	17.05
Total World .....	30.13	30.35	31.55	33.04	34.23	35.34	36.18

<sup>1</sup> Based upon rated nameplate capacity of existing facilities and those under construction or firmly committed by May 1977. Nitrogen capacity is for anhydrous ammonia only. Phosphate capacity is for wet process phosphoric acid only and potash capacity is based on marketable production of potash minerals.

Source: FAO. *Current Situation and Outlook*, FERT/77/3 — August 1977, Commission on Fertilizers, Fourth Session, Rome, September 27-30, 1977. Based upon estimates by the FAO/UNIDO/World Bank Working Group on Fertilizers, June 1977.

Appendix table 1—Use of nitrogen as fertilizer, by States, 1972-77<sup>1</sup>

State and region	1972	1973	1974	1975	1976	1977
	<i>1,000 tons of N</i>					
Maine . . . . .	14.7	16.1	16.8	14.9	14.3	14.2
New Hampshire . . . . .	2.3	2.5	2.6	2.3	2.7	2.7
Vermont . . . . .	6.6	7.0	7.9	7.0	7.6	7.4
Massachusetts . . . . .	8.9	10.1	9.0	7.9	8.8	9.0
Rhode Island . . . . .	1.8	1.8	2.7	1.6	1.9	2.3
Connecticut . . . . .	7.8	9.0	8.6	7.7	8.3	8.9
New York . . . . .	77.2	88.0	91.8	88.6	77.9	86.8
New Jersey . . . . .	21.4	26.4	25.2	24.6	25.3	24.6
Pennsylvania . . . . .	76.1	91.0	85.0	78.6	95.7	96.8
Delaware . . . . .	13.2	15.1	15.5	14.7	16.9	20.3
Maryland . . . . .	42.3	55.0	46.6	54.7	57.0	70.2
Dist. of Columbia . . . . .	.6	.6	.8	1.0	1.1	1.1
Northeast . . . . .	272.9	322.6	312.5	303.6	317.5	344.3
Michigan . . . . .	153.7	143.8	155.7	136.7	184.0	217.4
Wisconsin . . . . .	129.1	116.7	140.0	133.4	171.8	203.9
Minnesota . . . . .	374.4	424.0	412.8	450.3	561.3	521.0
Lake States . . . . .	657.2	684.5	708.5	720.4	917.1	942.3
Ohio . . . . .	242.3	237.8	289.5	281.7	355.7	363.5
Indiana . . . . .	340.3	327.5	361.7	326.3	417.6	495.7
Illinois . . . . .	549.7	570.9	729.7	817.8	934.5	977.6
Iowa . . . . .	662.6	643.7	750.6	746.9	1,042.9	852.4
Missouri . . . . .	329.1	276.2	352.5	304.8	405.1	406.3
Corn Belt . . . . .	2,124.0	2,056.1	2,484.0	2,477.6	3,155.8	3,095.5
North Dakota . . . . .	83.1	133.5	132.7	140.7	201.2	223.3
South Dakota . . . . .	78.7	98.8	104.5	82.1	112.3	95.8
Nebraska . . . . .	550.3	566.9	588.9	492.0	653.0	749.0
Kansas . . . . .	467.2	503.4	564.5	568.0	645.0	636.8
Northern Plains . . . . .	1,179.3	1,302.7	1,390.5	1,282.7	1,611.5	1,704.9
Virginia . . . . .	83.2	86.4	82.2	90.8	99.4	114.4
West Virginia . . . . .	7.8	8.2	8.7	6.4	8.7	10.7
North Carolina . . . . .	192.4	203.2	218.5	220.1	254.2	261.8
Kentucky . . . . .	108.9	113.3	128.8	124.8	152.2	182.8
Tennessee . . . . .	99.1	104.2	113.0	100.8	109.1	131.0
Appalachian . . . . .	491.4	515.3	551.3	542.8	623.6	700.7
South Carolina . . . . .	91.3	97.3	104.2	89.6	112.6	116.0
Georgia . . . . .	268.4	285.4	284.6	265.4	322.3	349.8
Florida . . . . .	199.6	210.0	212.1	187.4	220.4	248.7
Alabama . . . . .	163.5	171.1	174.5	149.7	176.9	188.3
Southeast . . . . .	722.8	763.8	775.3	692.1	832.2	902.8
Mississippi . . . . .	205.8	205.1	228.5	187.1	202.9	190.5
Arkansas . . . . .	127.7	122.7	152.1	127.7	156.1	173.0
Louisiana . . . . .	143.3	118.1	151.7	110.6	125.8	124.3
Delta States . . . . .	476.8	445.9	532.2	425.4	484.8	487.8
Oklahoma . . . . .	177.9	202.6	211.2	190.7	229.6	256.6
Texas . . . . .	718.2	711.6	802.3	624.7	747.2	748.6
Southern Plains . . . . .	896.1	914.2	1,013.4	815.4	976.8	1,002.6
Montana . . . . .	43.9	52.9	46.0	39.0	54.0	64.0
Idaho . . . . .	102.0	124.9	125.2	127.5	156.2	139.0
Wyoming . . . . .	20.2	22.6	20.8	23.1	21.0	19.6
Colorado . . . . .	91.0	97.2	118.0	110.6	128.8	118.8
New Mexico . . . . .	29.4	30.9	34.6	29.9	36.6	32.3
Arizona . . . . .	102.1	102.5	114.3	109.3	104.6	110.0
Utah . . . . .	19.6	22.3	25.7	22.7	33.1	27.0
Nevada . . . . .	3.9	4.2	4.2	3.7	5.0	4.8
Mountain . . . . .	412.1	457.5	488.8	465.7	539.3	515.5
Washington . . . . .	168.5	190.4	204.9	181.2	196.1	175.1
Oregon . . . . .	96.6	113.9	98.2	98.9	127.8	127.2
California . . . . .	473.2	479.6	545.7	556.3	587.1	596.1
Pacific . . . . .	738.3	784.0	848.8	836.4	911.0	898.4
48 States + D.C. . . . .	7,970.9	8,246.6	9,105.5	8,562.1	10,369.6	10,596.7
Alaska . . . . .	.9	1.2	.9	.6	1.0	1.8
Hawaii . . . . .	29.5	28.0	26.3	25.9	25.2	25.7
United States . . . . .	8,001.3	8,275.8	9,132.7	8,588.6	10,395.5	10,624.2

<sup>1</sup> Totals may not add due to rounding.

Source: "Consumption of Commercial Fertilizers in the United States," SPCR 7 (11-77) and earlier issues, Crop Reporting Board, SRS, USDA, Nov. 1, 1977.

Appendix table 2—Use of phosphorous as fertilizer, by States, 1972-77<sup>1</sup>

State and region	1972	1973	1974	1975	1976	1977
	<i>1,000 tons available P<sub>2</sub>O<sub>5</sub></i>					
Maine . . . . .	17.8	18.7	18.8	16.3	17.3	17.0
New Hampshire . . . . .	2.0	1.9	2.1	2.3	3.3	2.2
Vermont . . . . .	7.8	6.8	7.7	5.9	6.5	8.6
Massachusetts . . . . .	6.3	7.7	7.0	5.6	6.0	5.9
Rhode Island . . . . .	1.6	1.6	2.6	1.4	1.2	1.6
Connecticut . . . . .	5.8	6.7	5.5	5.2	6.6	5.8
New York . . . . .	90.5	83.7	78.2	69.8	73.2	78.5
New Jersey . . . . .	18.7	22.4	20.7	20.0	19.6	21.5
Pennsylvania . . . . .	87.6	96.4	96.3	77.2	92.7	94.7
Delaware . . . . .	11.7	15.9	13.7	12.2	12.0	13.7
Maryland . . . . .	42.3	55.6	43.9	46.0	44.0	59.7
Dist. of Columbia . . . . .	.6	.6	.5	.6	.4	.5
Northeast . . . . .	292.7	318.0	297.0	262.4	284.0	308.5
Michigan . . . . .	148.2	139.7	148.4	114.5	144.7	161.7
Wisconsin . . . . .	135.8	132.2	139.7	130.8	144.8	166.0
Minnesota . . . . .	261.5	280.3	167.9	290.0	321.9	295.6
Lake States . . . . .	545.5	552.2	556.0	535.3	610.9	623.3
Ohio . . . . .	237.9	244.6	271.0	246.9	275.4	287.6
Indiana . . . . .	247.4	264.0	292.4	218.7	282.6	339.8
Illinois . . . . .	458.2	479.1	477.1	422.7	509.0	587.1
Iowa . . . . .	402.1	380.3	396.6	424.5	463.9	417.8
Missouri . . . . .	192.2	177.2	189.9	152.8	203.9	211.4
Corn Belt . . . . .	1,537.8	1,545.2	1,627.0	1,465.6	1,734.8	1,843.7
North Dakota . . . . .	77.7	108.0	110.2	105.6	130.9	140.7
South Dakota . . . . .	53.5	62.2	61.9	55.3	66.1	55.9
Nebraska . . . . .	149.3	157.6	146.6	110.9	148.8	186.0
Kansas . . . . .	174.3	199.5	178.8	173.8	198.9	198.9
Northern Plains . . . . .	454.8	527.3	497.4	445.6	544.7	581.5
Virginia . . . . .	79.3	76.8	70.4	68.9	71.7	78.5
West Virginia . . . . .	11.8	10.9	9.5	7.4	8.9	10.8
North Carolina . . . . .	135.0	144.7	156.9	143.6	161.5	163.9
Kentucky . . . . .	104.7	112.2	112.4	104.5	130.8	150.5
Tennessee . . . . .	93.9	99.6	95.9	79.6	95.5	122.4
Appalachian . . . . .	424.7	444.2	445.2	4403.9	467.8	526.1
South Carolina . . . . .	71.2	74.9	75.7	60.1	69.7	77.8
Georgia . . . . .	147.8	161.3	153.9	131.7	157.5	180.3
Florida . . . . .	108.2	111.0	104.9	87.5	102.6	112.8
Alabama . . . . .	114.1	116.3	115.0	92.2	99.5	114.5
Southeast . . . . .	441.3	463.5	449.6	371.5	429.3	485.4
Mississippi . . . . .	83.2	87.8	87.4	68.2	72.1	90.2
Arkansas . . . . .	81.1	77.3	80.9	56.6	71.8	78.4
Louisiana . . . . .	62.6	61.7	71.5	58.6	60.8	68.4
Delta States . . . . .	226.9	226.8	239.8	183.4	204.7	237.0
Oklahoma . . . . .	96.5	109.1	105.4	88.8	103.3	113.2
Texas . . . . .	289.9	288.9	297.4	224.0	263.9	277.7
Southern Plains . . . . .	386.4	398.0	402.7	312.8	367.2	390.9
Montana . . . . .	50.2	62.4	60.8	44.0	63.0	74.3
Idaho . . . . .	59.6	74.8	68.9	70.1	68.4	61.1
Wyoming . . . . .	13.8	14.5	10.8	11.2	8.3	6.8
Colorado . . . . .	45.5	48.0	44.6	46.1	53.8	43.8
New Mexico . . . . .	15.0	21.8	15.7	11.2	16.9	17.6
Arizona . . . . .	38.6	39.0	36.0	29.8	37.6	41.5
Utah . . . . .	26.9	27.6	24.8	20.5	16.6	17.1
Nevada . . . . .	2.4	3.1	2.7	2.4	3.0	2.1
Mountain . . . . .	252.0	291.2	264.4	235.4	267.6	264.3
Washington . . . . .	50.7	63.2	71.1	64.1	69.9	65.3
Oregon . . . . .	41.9	49.1	40.6	37.9	40.8	50.3
California . . . . .	177.7	178.8	178.3	165.0	181.6	213.2
Pacific . . . . .	270.3	291.1	290.0	266.9	292.3	328.8
48 States + D.C. . . . .	4,832.4	5,057.5	5,069.1	4,482.8	5,202.2	5,590.4
Alaska . . . . .	.7	.7	.5	.5	.7	1.3
Hawaii . . . . .	22.1	19.4	19.9	20.1	18.1	23.3
United States . . . . .	4,855.2	5,077.6	5,089.5	4,503.4	5,221.0	5,615.1

<sup>1</sup> Totals may not add due to rounding.

Source: "Consumption of Commercial Fertilizers in the United States," SPCR 7 (11-77) and earlier issues, Crop Reporting Board, SRS, USDA, Nov. 1, 1977

Appendix table 3—Use of potash as fertilizer, by States, 1972-77<sup>1</sup>

State and region	1972	1973	1974	1975	1976	1977
	<i>1,000 tons of K<sub>2</sub>O</i>					
Maine . . . . .	17.1	18.4	19.3	17.0	17.3	16.9
New Hampshire . . . . .	2.5	2.3	2.7	2.4	3.2	2.9
Vermont . . . . .	7.8	7.7	9.1	6.7	7.9	7.3
Massachusetts . . . . .	6.1	6.9	7.3	6.0	6.8	6.7
Rhode Island . . . . .	1.6	1.5	2.5	1.4	1.3	1.6
Connecticut . . . . .	5.8	6.8	7.3	5.4	6.3	4.8
New York . . . . .	78.1	78.7	79.0	70.9	74.8	81.4
New Jersey . . . . .	18.6	21.1	21.9	19.8	21.3	23.2
Pennsylvania . . . . .	78.2	77.1	83.5	72.2	89.1	88.6
Delaware . . . . .	16.2	20.4	19.4	18.9	19.4	22.9
Maryland . . . . .	44.4	61.4	56.5	57.3	57.9	73.5
Dist. of Columbia . . . . .	.4	.4	.4	.5	.4	.4
Northeast . . . . .	276.8	302.9	308.7	278.6	305.7	330.3
Michigan . . . . .	165.6	164.9	179.8	146.3	187.3	219.2
Wisconsin . . . . .	227.6	228.5	271.3	237.0	290.3	351.9
Minnesota . . . . .	258.9	288.7	323.1	329.1	350.6	360.8
Lake States . . . . .	652.1	682.1	774.2	712.4	828.2	931.9
Ohio . . . . .	260.0	271.6	309.8	281.5	329.8	351.3
Indiana . . . . .	305.1	338.2	403.7	318.2	397.5	522.0
Illinois . . . . .	466.9	533.5	605.8	531.5	658.3	764.3
Iowa . . . . .	367.1	391.0	460.4	442.8	496.4	478.2
Missouri . . . . .	214.3	200.5	216.8	185.2	254.5	268.3
Corn Belt . . . . .	1,613.4	1,734.8	1,996.6	1,759.3	2,136.5	2,384.1
North Dakota . . . . .	9.4	13.5	17.6	16.5	18.0	18.7
South Dakota . . . . .	9.9	13.8	16.1	13.3	14.5	15.0
Nebraska . . . . .	43.1	53.2	57.4	44.2	55.1	69.7
Kansas . . . . .	46.6	90.9	62.0	45.7	48.4	54.7
Northern Plains . . . . .	109.0	171.4	153.1	119.7	136.0	158.1
Virginia . . . . .	87.8	89.0	80.8	83.7	89.4	97.5
West Virginia . . . . .	8.7	6.5	8.7	5.0	7.5	8.8
North Carolina . . . . .	168.7	187.8	203.7	189.7	224.2	232.1
Kentucky . . . . .	115.4	122.8	134.4	117.0	148.3	169.7
Tennessee . . . . .	102.6	107.1	108.0	88.3	109.2	130.3
Appalachian . . . . .	483.2	513.3	535.7	483.7	578.6	639.4
South Carolina . . . . .	96.9	103.9	113.6	92.2	112.9	133.0
Georgia . . . . .	220.3	238.6	242.2	209.9	246.7	273.9
Florida . . . . .	226.3	231.8	232.1	210.7	242.1	249.7
Alabama . . . . .	119.7	121.4	124.1	99.7	112.2	132.3
Southeast . . . . .	663.2	695.8	712.0	612.4	713.9	788.9
Mississippi . . . . .	77.3	83.5	81.4	62.3	72.7	95.9
Arkansas . . . . .	88.5	82.3	95.0	66.0	84.6	96.2
Louisiana . . . . .	61.3	61.2	67.7	60.5	64.5	75.4
Delta States . . . . .	227.1	227.0	244.1	188.8	221.8	267.5
Oklahoma . . . . .	34.1	39.0	41.3	28.0	29.3	34.3
Texas . . . . .	108.9	115.5	133.3	92.0	80.6	98.7
Southern Plains . . . . .	148.0	154.5	174.7	120.0	109.9	133.0
Montana . . . . .	2.5	3.0	4.2	3.2	5.7	8.6
Idaho . . . . .	3.5	5.3	7.1	11.6	14.5	12.8
Wyoming . . . . .	1.3	1.9	.9	1.3	1.0	1.1
Colorado . . . . .	8.8	7.8	10.1	9.2	9.9	11.0
New Mexico . . . . .	1.6	1.8	2.8	1.3	1.7	1.6
Arizona . . . . .	1.5	1.5	1.5	1.4	.6	1.2
Utah . . . . .	.5	.8	.9	.7	1.3	.8
Nevada . . . . .	.1	.2	.2	.2	.2	.2
Mountain . . . . .	19.8	22.3	27.7	28.8	34.9	37.3
Washington . . . . .	21.1	23.9	26.8	23.2	27.5	30.2
Oregon . . . . .	13.9	20.1	17.7	14.2	18.5	25.6
California . . . . .	64.1	61.5	71.2	73.6	61.2	69.1
Pacific . . . . .	99.1	105.5	115.8	111.0	107.2	124.9
48 States + D.C. . . . .	4,291.7	4,609.6	5,042.7	4,414.8	5,172.7	5,795.4
Alaska . . . . .	.4	.5	.3	.4	.5	1.2
Hawaii . . . . .	23.6	24.0	22.8	23.3	25.0	24.0
United States . . . . .	4,315.7	4,634.1	5,065.8	4,438.5	5,198.2	5,821.0

<sup>1</sup> Totals may not add due to rounding.

Source: "Consumption of Commercial Fertilizers in the United States," SPCR 7 (11-77) and earlier issues, Crop Reporting Board, SRS, USDA, Nov. 1, 1977





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