

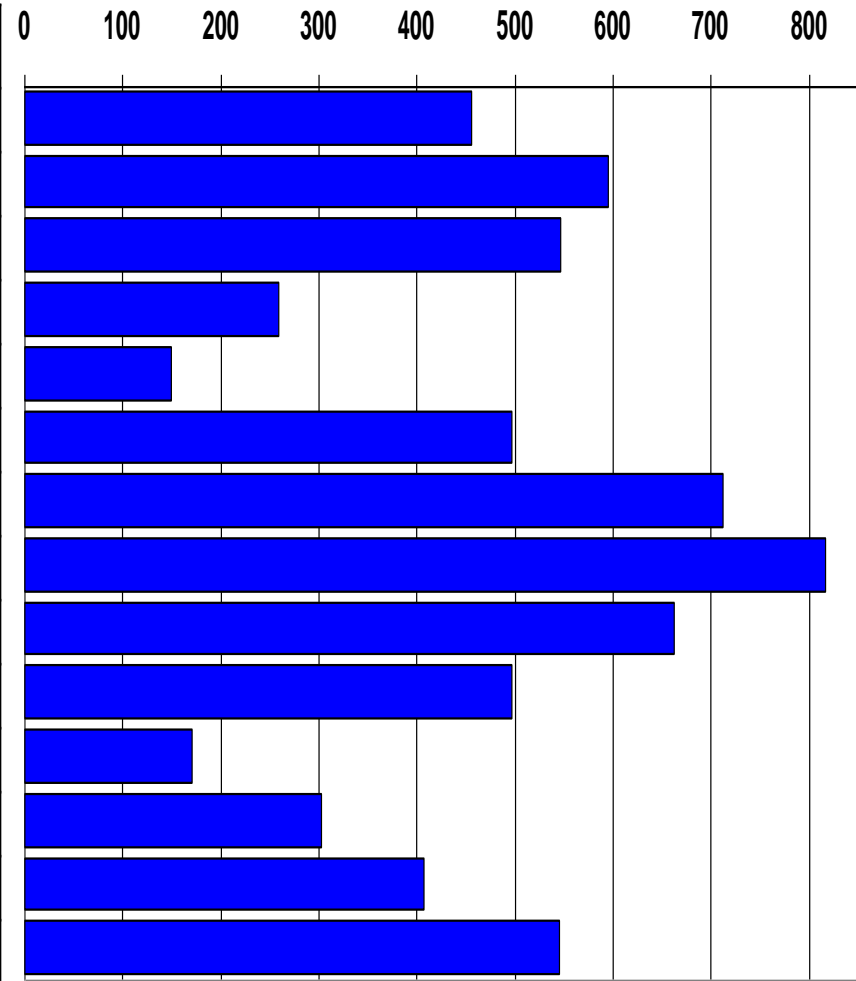


Magruder Check Sample:

2016 Year End Summary

14 Samples in 2016

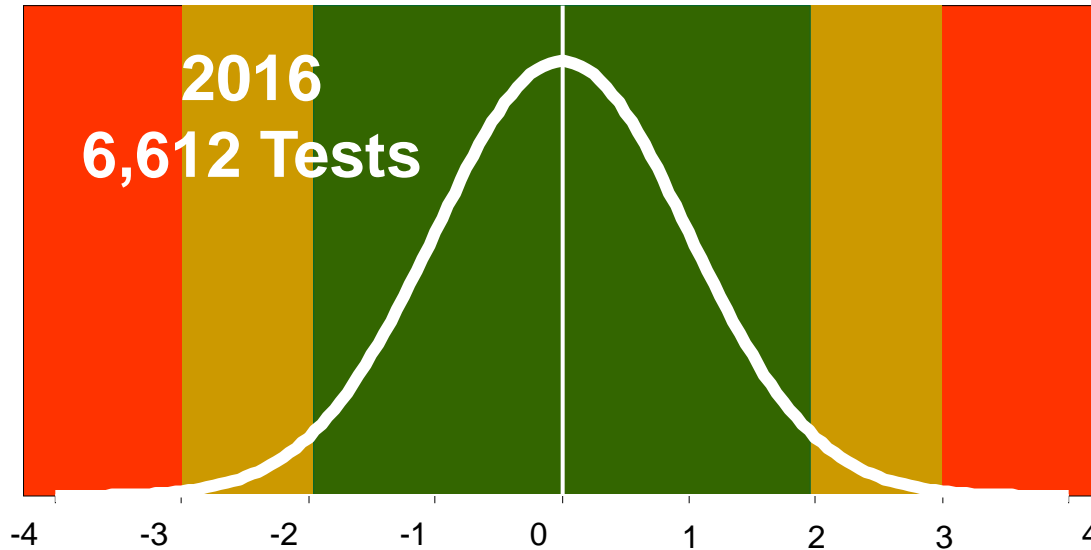
| Sample | Sample Name | # Tests |
|--------|-----------------|---------|
| 160111 | Micro Mix | 455 |
| 160211 | Grade 24-25-4 | 595 |
| 160311 | Grade 5-2-0 | 546 |
| 160411 | Liquid Thio S | 259 |
| 160511 | Urea | 149 |
| 160512 | Micros | 496 |
| 160611 | WS 25-5-15 | 712 |
| 160711 | 12-12-12 Micros | 817 |
| 160811 | Liquid Organic | 662 |
| 160911 | MAP | 497 |
| 161011 | MOP | 170 |
| 161012 | ZnSO4 | 302 |
| 161111 | Grade 32-0-10 | 407 |
| 161211 | MAP plus S | 545 |



Z-Cut Homogeneity Screening

| Sample Number | Homogeneity Decision | Pass Z Cut < 3%RSD | Number of Pairs in Z Cut | % Nitrogen |
|---------------|----------------------|--------------------|--------------------------|------------|
| 160111 | Low n | 13.0% | 2 | 0.12 |
| 160211 | PASS | 1.0% | 35 | 24.66 |
| 160311 | *PASS | 2.6% | 37 | 5.47 |
| 160411 | Low n | 109.1% | 3 | 0.08 |
| 160511 | PASS | 0.3% | 37 | 46.26 |
| 160512 | Low n | 3.5% | 5 | 2.49 |
| 160611 | FAIL | 10.3% | 32 | 24.03 |
| 160711 | PASS | 0.0% | 42 | 12.44 |
| 160811 | *PASS | 4.5% | 35 | 5.18 |
| 160911 | PASS | 2.5% | 34 | 11.01 |
| 161011 | Low n | 39.6% | 2 | 0.03 |
| 161012 | Low n | 0.0% | 5 | 2.84 |
| 161111 | PASS | 0.7% | 37 | 32.43 |
| 161211 | PASS | 0.0% | 40 | 12.09 |

2016 Z-Score Compliance



| | Action -3 > Z > 3 | Warning | Compliant -2 < Z < 2 |
|----------------|--|----------------------|---|
| Analyte | 6.6% (419) | 4.4% (281) | 89.0% (5,689) |
| Method | 4.0% (217) | 2.7% (150) | 93.3% (5,123) |

| | | | |
|------------------------|--------------|--------------|---------------|
| Standard Normal | 0.27% | 4.28% | 95.45% |
|------------------------|--------------|--------------|---------------|

2016 Labs Separated by Group

| | International | Private | Public |
|-------------------------------|---------------|---------|--------|
| Number Labs Listed | 44 | 41 | 44 |
| Number Participating | 42 | 32 | 37 |
| Number of Individual Analytes | 44 | 42 | 39 |
| Number of Individual Methods | 165 | 136 | 139 |

Z-Score Compliance

| | | | |
|-------------------------------|--------------|--------------|--------------|
| Action $-3 > Z > 3$ | 7.0% | 7.9% | 5.0% |
| Warning | 4.8% | 5.0% | 3.5% |
| Compliant $-2 < Z < 2$ | 88.2% | 87.1% | 91.5% |

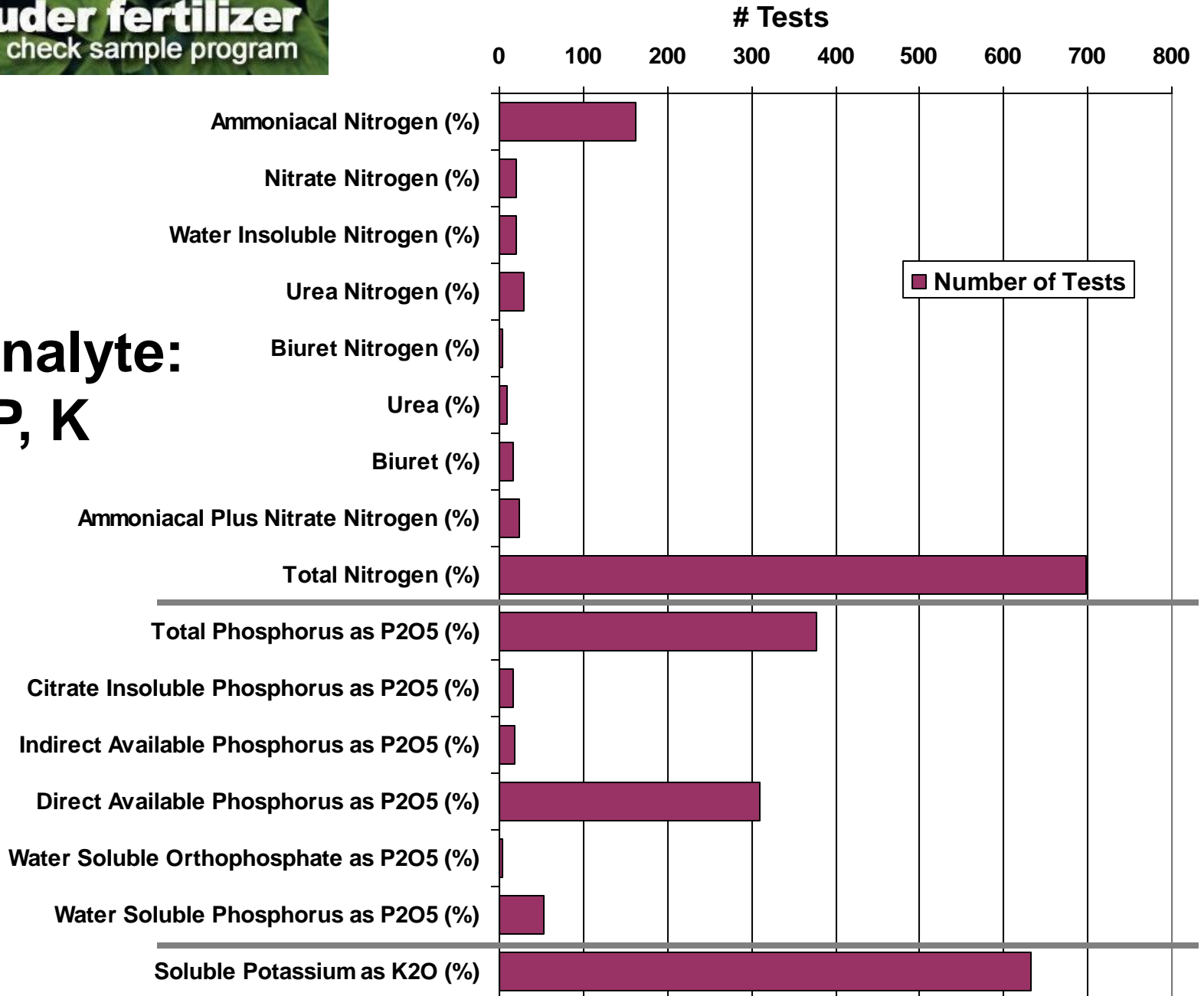
2016 Z-Score Compliance in Lab Groups

| | | N | P | K |
|----------------------|-----------|--------------|--------------|--------------|
| International | Action | 10.6% | 4.5% | 5.4% |
| | Warning | 7.8% | 4.1% | 2.5% |
| | Compliant | 81.6% | 91.4% | 92.1% |
| Private | Action | 4.3% | 9.1% | 9.0% |
| | Warning | 4.8% | 3.8% | 6.6% |
| | Compliant | 90.9% | 87.0% | 84.3% |
| Public | Action | 3.0% | 7.9% | 4.6% |
| | Warning | 3.4% | 3.9% | 4.6% |
| | Compliant | 93.7% | 88.2% | 90.9% |

2016 N, P, K Participation by Lab Groups (# Tests)

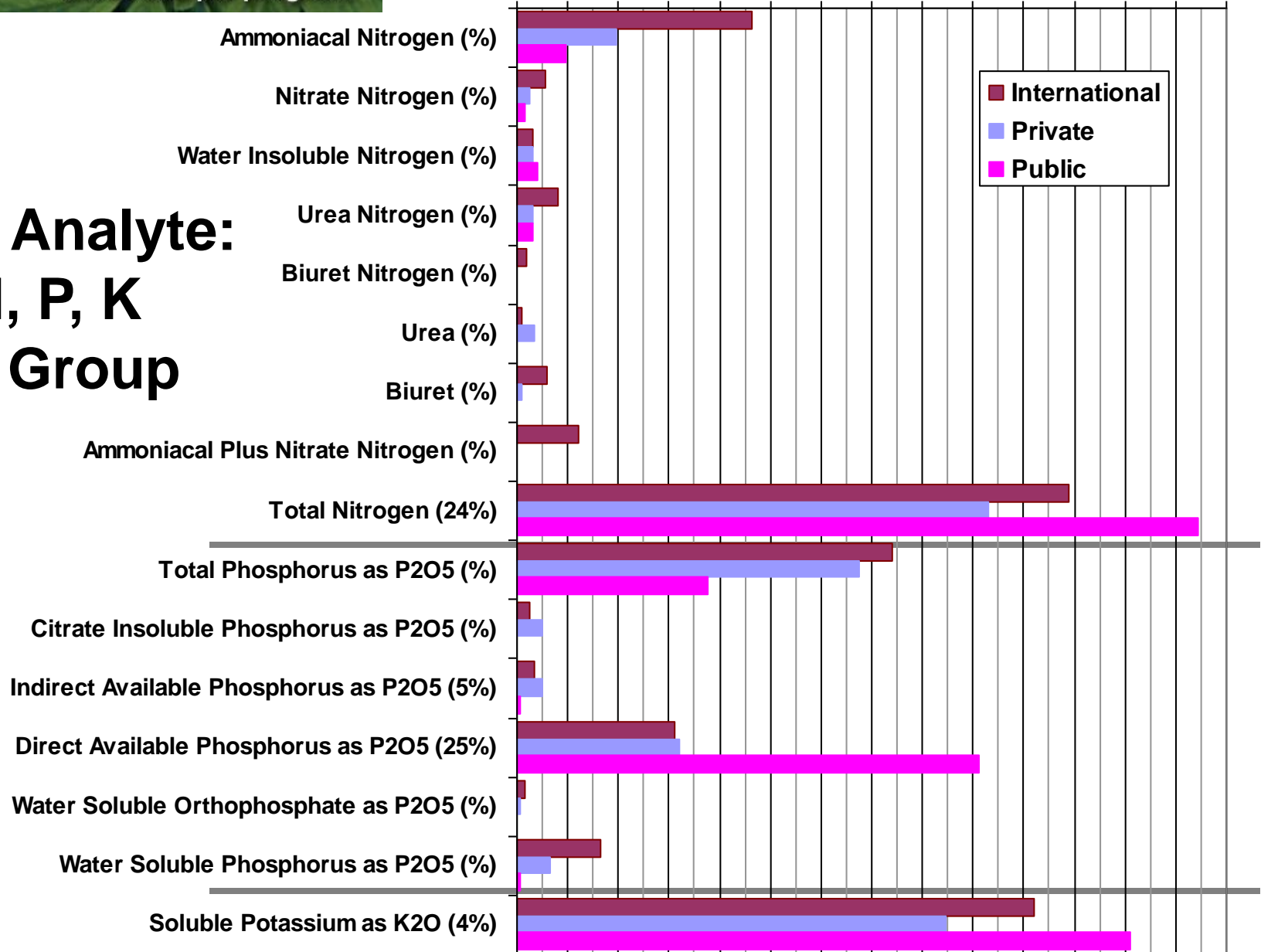
| Code | Analyte | International | Private | Public |
|------|--|---------------|---------|--------|
| 010 | Total Nitrogen (%) | 218 | 186 | 269 |
| 020 | Total Phosphorus as P ₂ O ₅ (%) | 210 | 199 | 257 |
| 041 | Direct Available Phosphorus as P ₂ O ₅ | | | |
| 050 | Soluble Potassium as K ₂ O (%) | 204 | 169 | 242 |

2016 Analyte: N, P, K

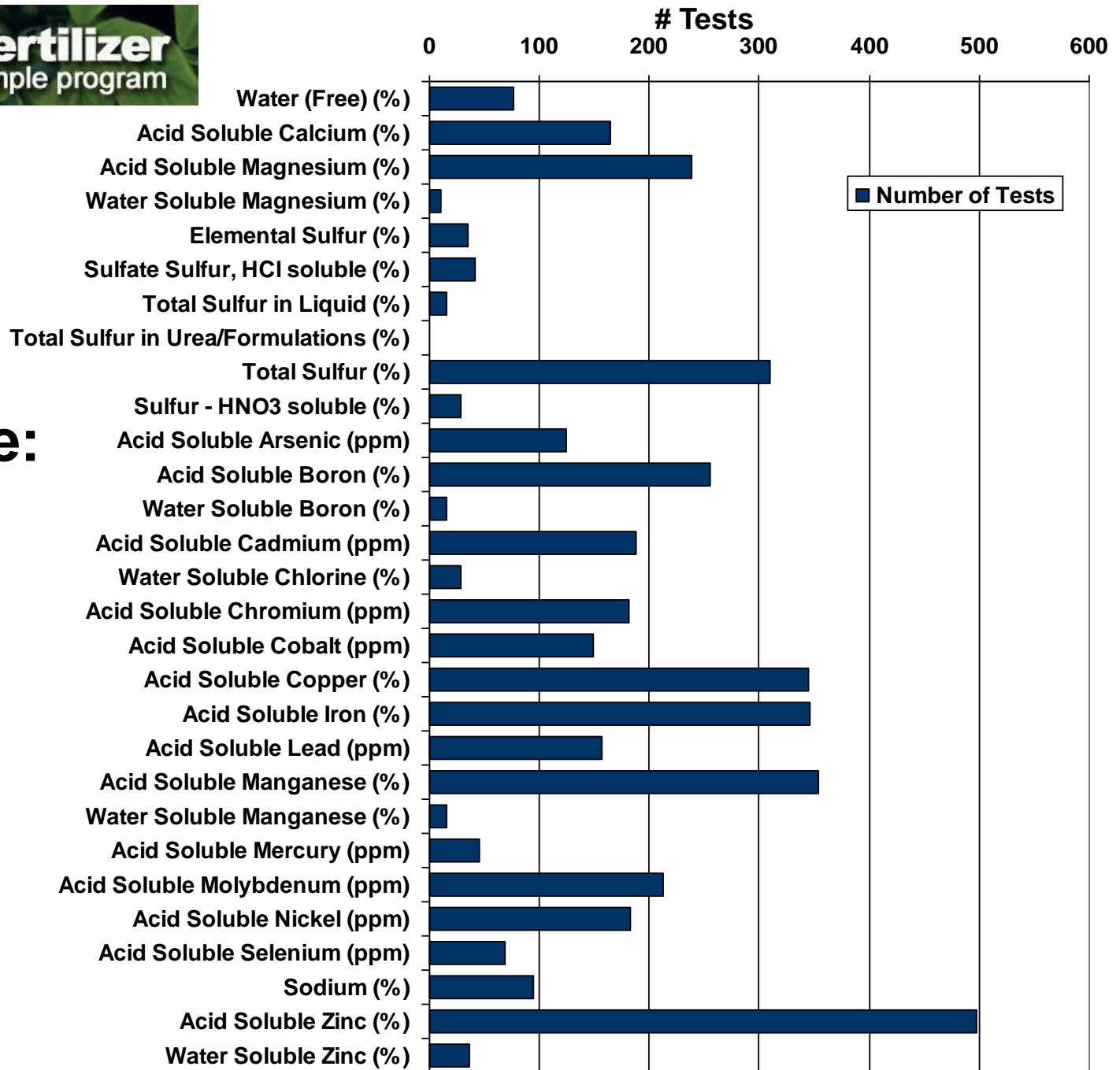


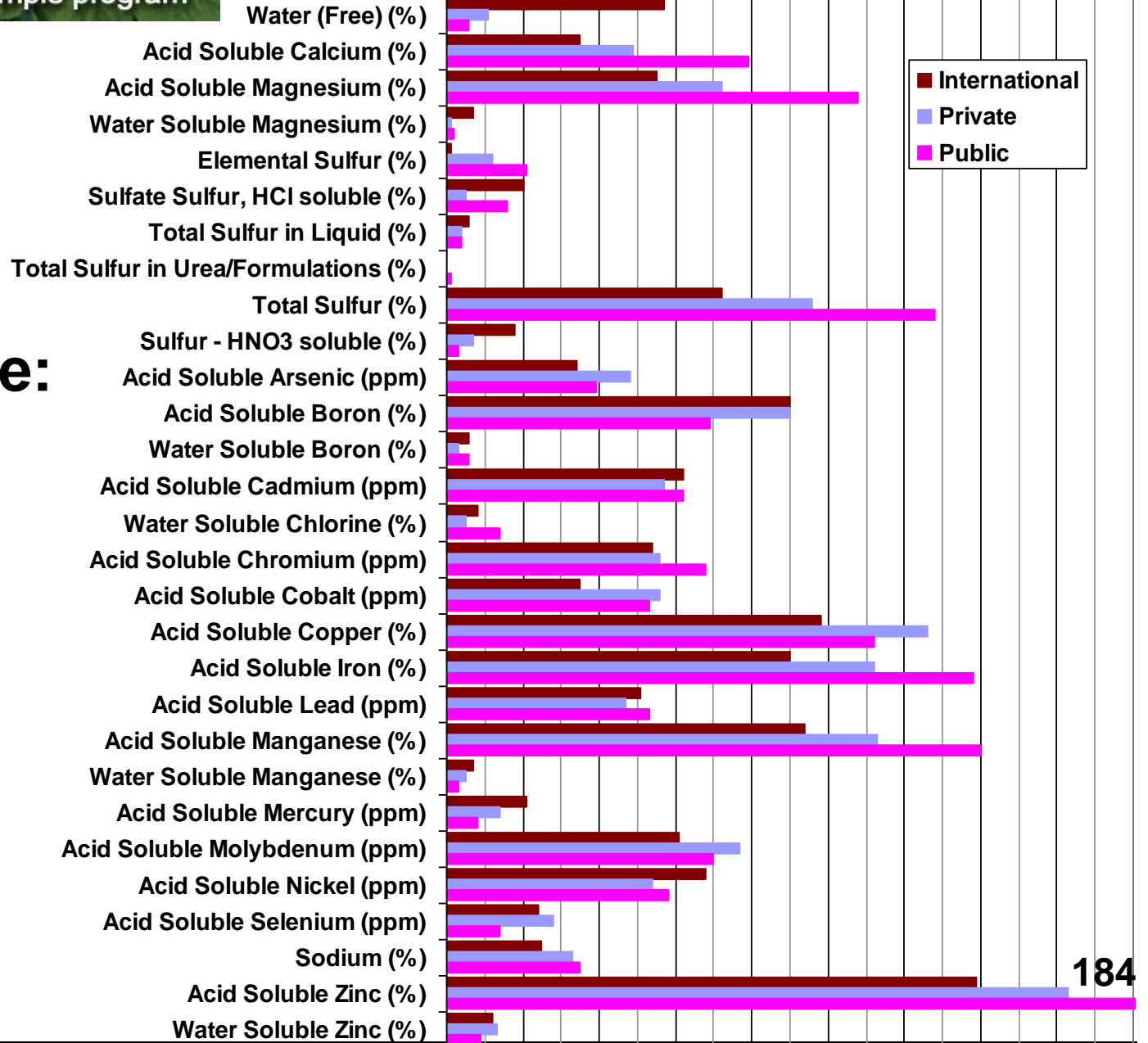
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280

**2016 Analyte:
N, P, K
by Group**



**2016 Analyte:
Other
Elements**





**2016 Analyte:
Other
Elements
by Group**

184 →

2016 Methods: Nitrogen

Tests

0 20 40 60 80 100 120 140 160 180 200

Ammoniacal Nitrogen, Magnesium Oxide Method (%)

Ammoniacal Nitrogen, Other (%)

Nitrate Nitrogen, Robertson (%)

Nitrate Nitrogen, Jones Modified (%)

Nitrate Nitrogen, Other (%)

Water Insoluble Nitrogen, Method I (%)

Water Insoluble Nitrogen, Other (%)

Urea Nitrogen, Urease (as N) (%)

Urea Nitrogen, Other (%)

Biuret Nitrogen, Spectrophotometric (as N) (%)

Biuret Nitrogen, Other (%)

Urea, Urease (as Urea) (%)

Urea, Other (%)

Biuret, Spectrophotometric (as Biuret) (%)

Biuret, Other (%)

Ammoniacal Plus Nitrate Nitrogen, Devarda (%)

Ammoniacal Plus Nitrate Nitrogen, Other (%)

Total Nitrogen, Modified Comprehensive (%)

Total Nitrogen, Salicylic (%)

Total Nitrogen, Raney (%)

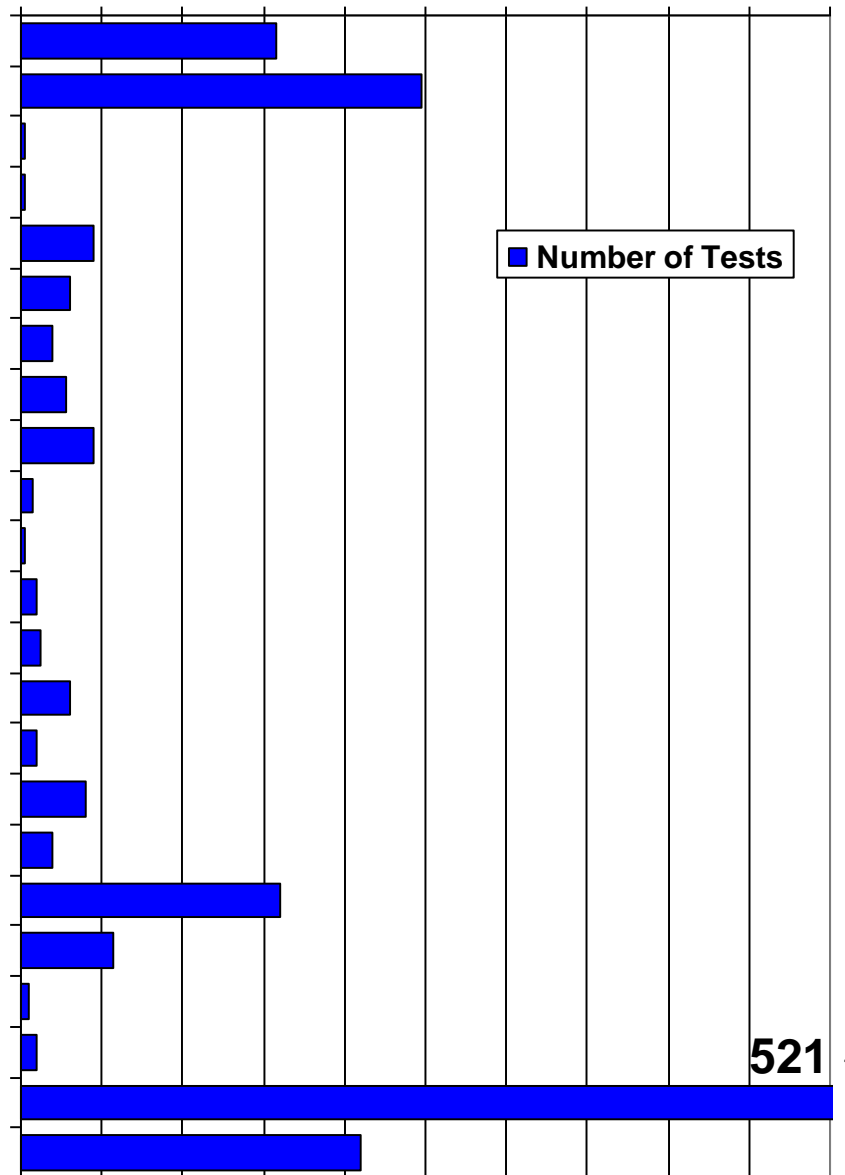
Total Nitrogen, Comprehensive (%)

Total Nitrogen, Combustion (%)

Total Nitrogen, Other (%)

■ Number of Tests

521 →



2016 Methods by Group: Nitrogen

0 10 20 30 40 50 60

Ammoniacal Nitrogen, Magnesium Oxide Method

Ammoniacal Nitrogen, Other

Nitrate Nitrogen, Robertson

Nitrate Nitrogen, Jones Modified

Nitrate Nitrogen, Other

Water Insoluble Nitrogen, Method I

Water Insoluble Nitrogen, Other

Urea Nitrogen, Urease (as N)

Urea Nitrogen, Other

Biuret Nitrogen, Spectrophotometric (as N)

Biuret Nitrogen, Other

Urea, Urease (as Urea)

Urea, Other

Biuret, Spectrophotometric (as Biuret)

Biuret, Other

Ammoniacal Plus Nitrate Nitrogen, Devarda

Ammoniacal Plus Nitrate Nitrogen, Other

Total Nitrogen, Modified Comprehensive

Total Nitrogen, Salicylic

Total Nitrogen, Raney

Total Nitrogen, Comprehensive

Total Nitrogen, Combustion

Total Nitrogen, Other

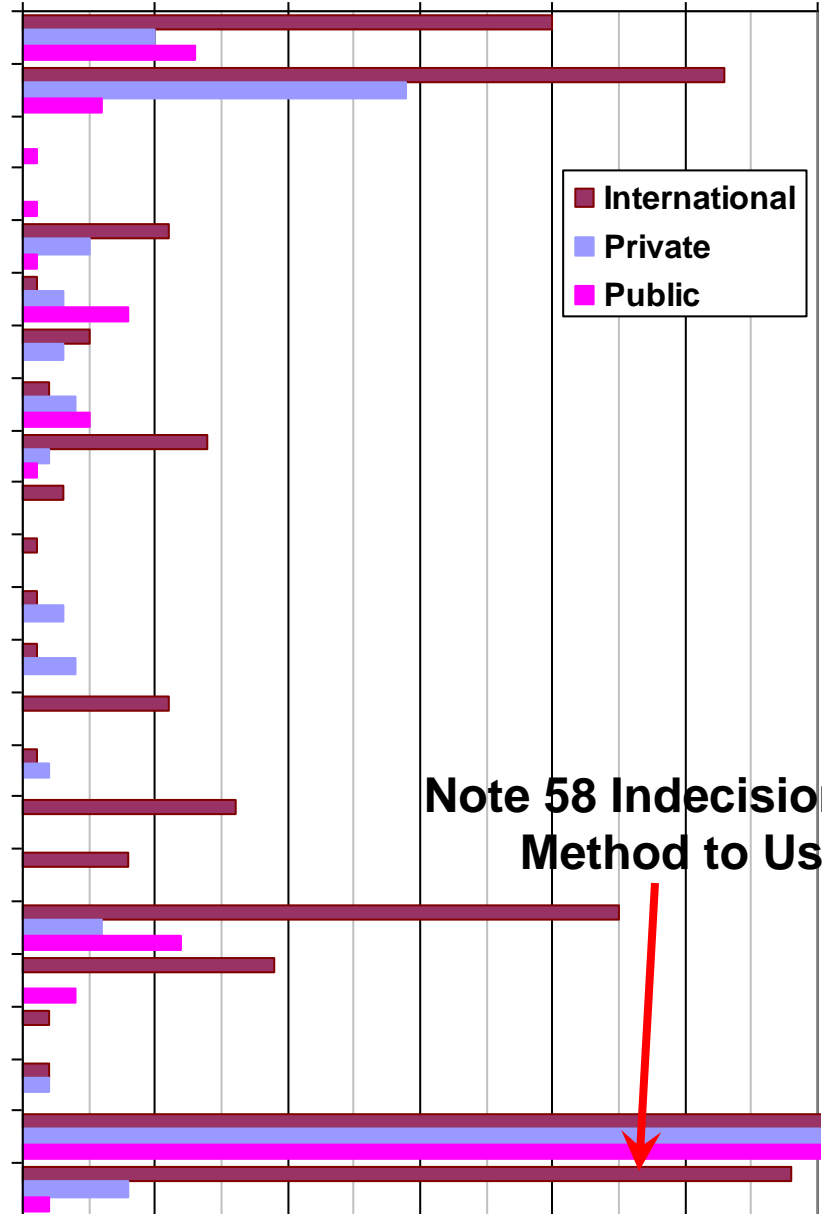


Note 58 Indecisions on Method to Use

92 →

170 →

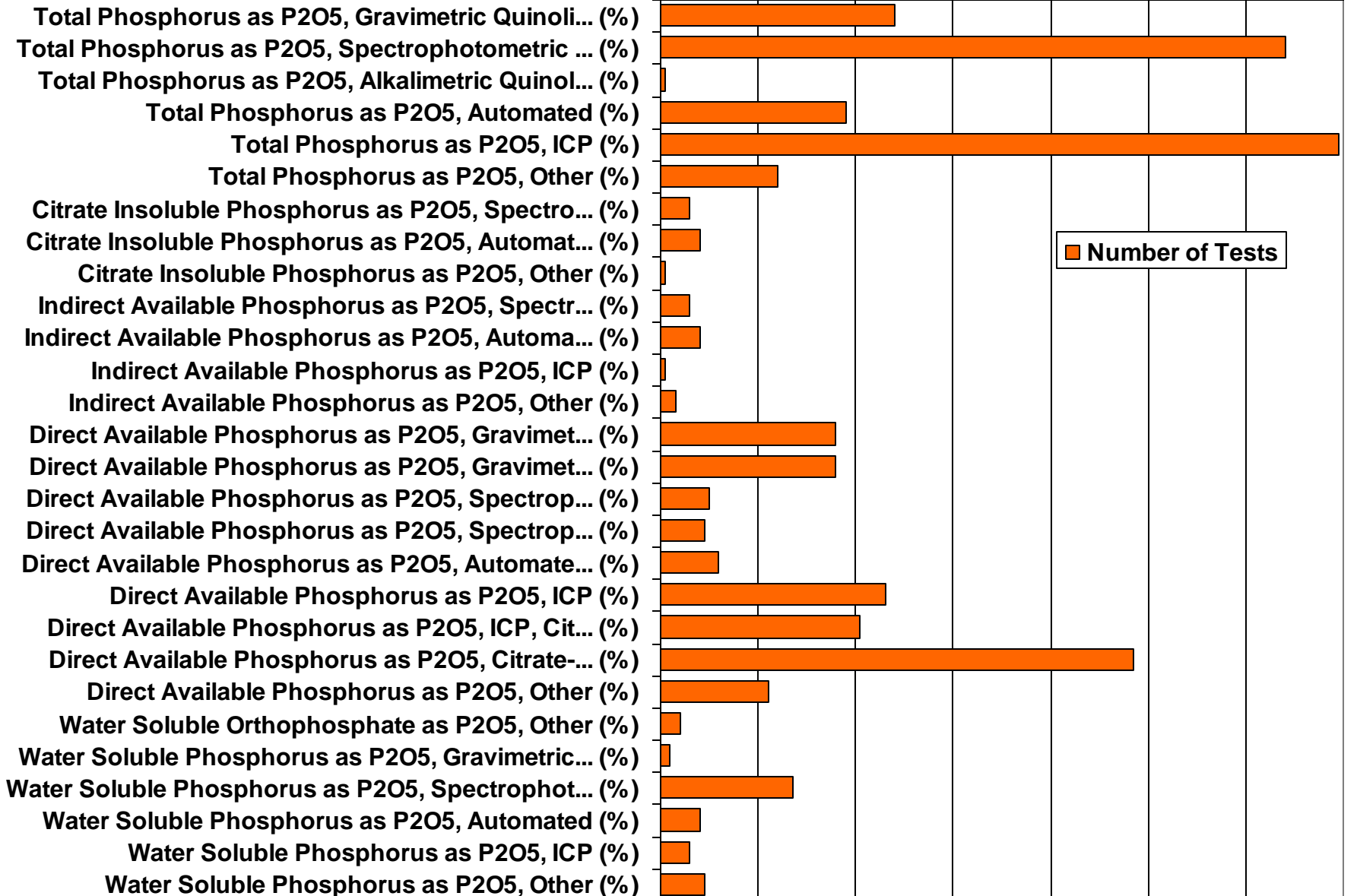
251 →



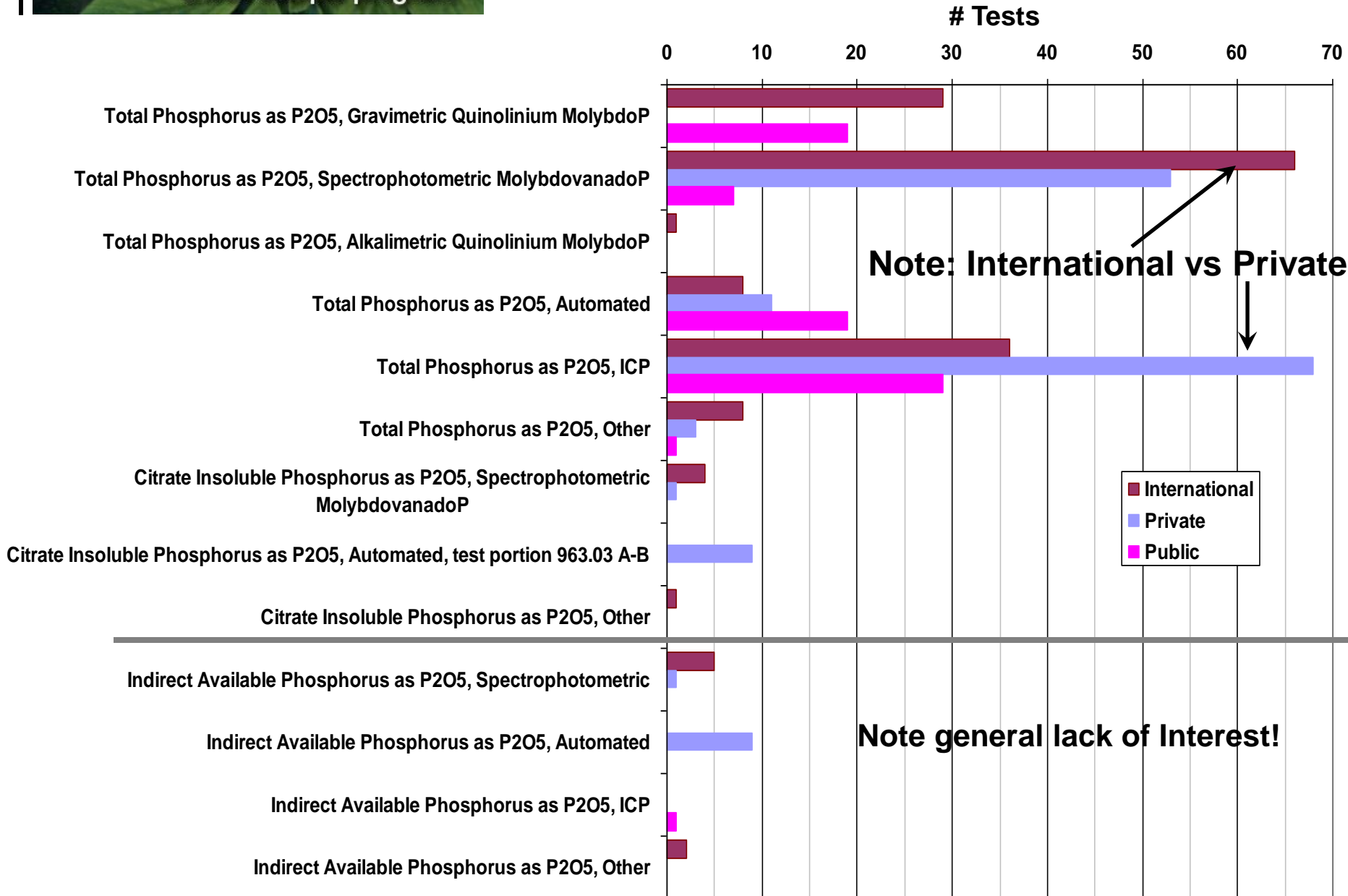
2016 Methods: Phosphorus

Tests

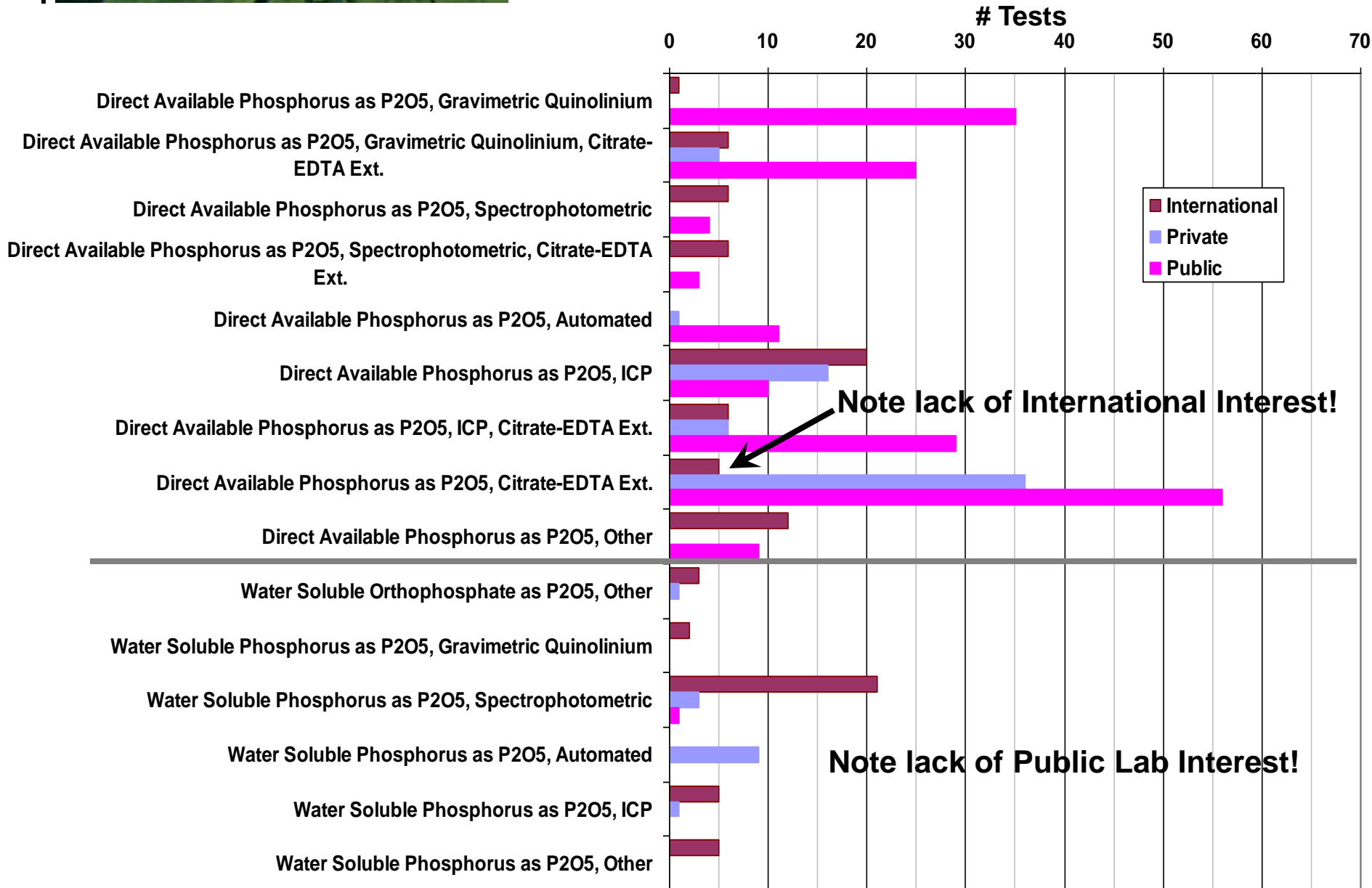
0 20 40 60 80 100 120 140



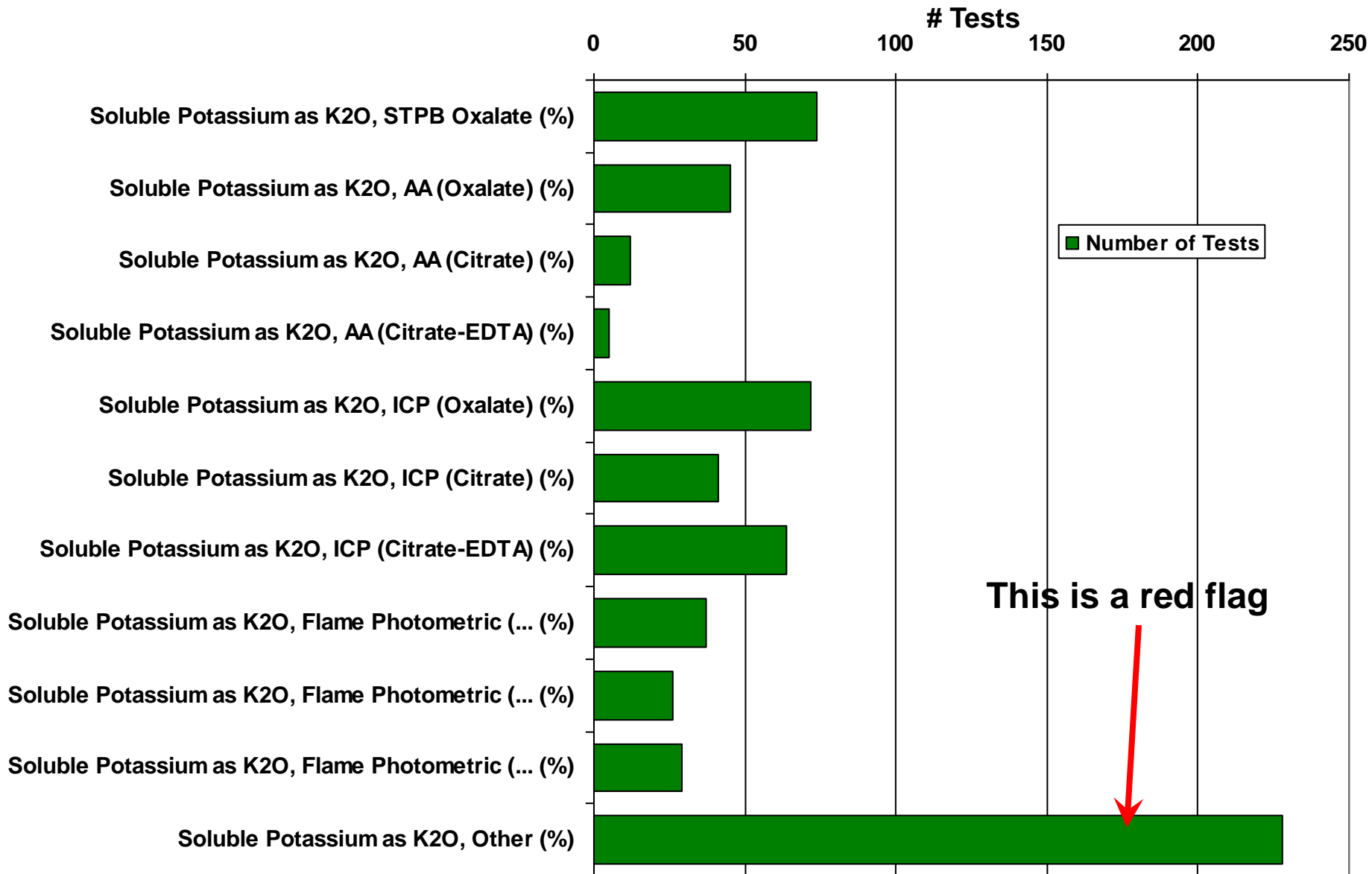
2016 Methods by Group: Phosphorus



2016 Methods by Group: Phosphorus



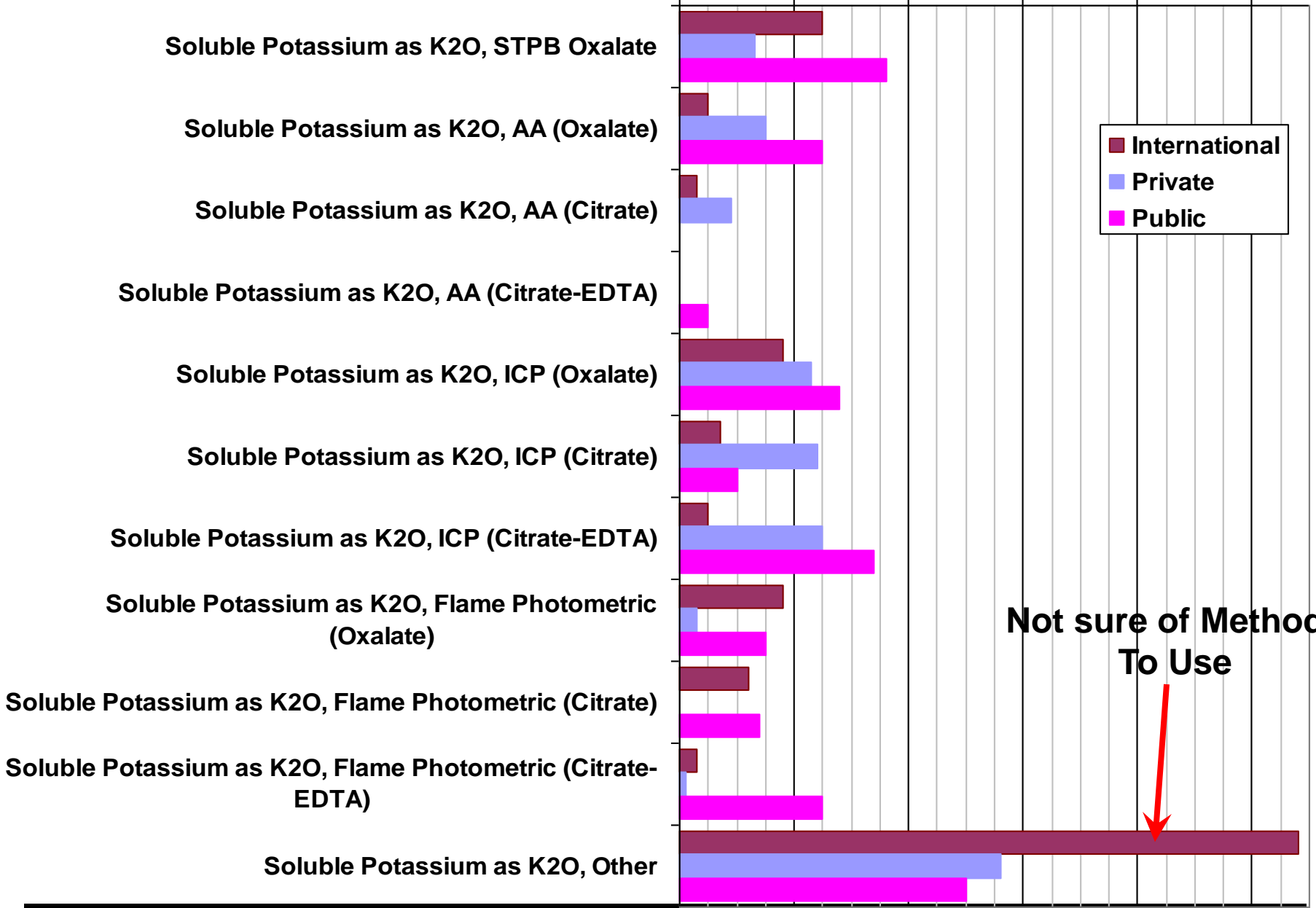
2016 Methods: Potassium





2016 Methods by Group: Potassium

0 20 40 60 80 100



■ International

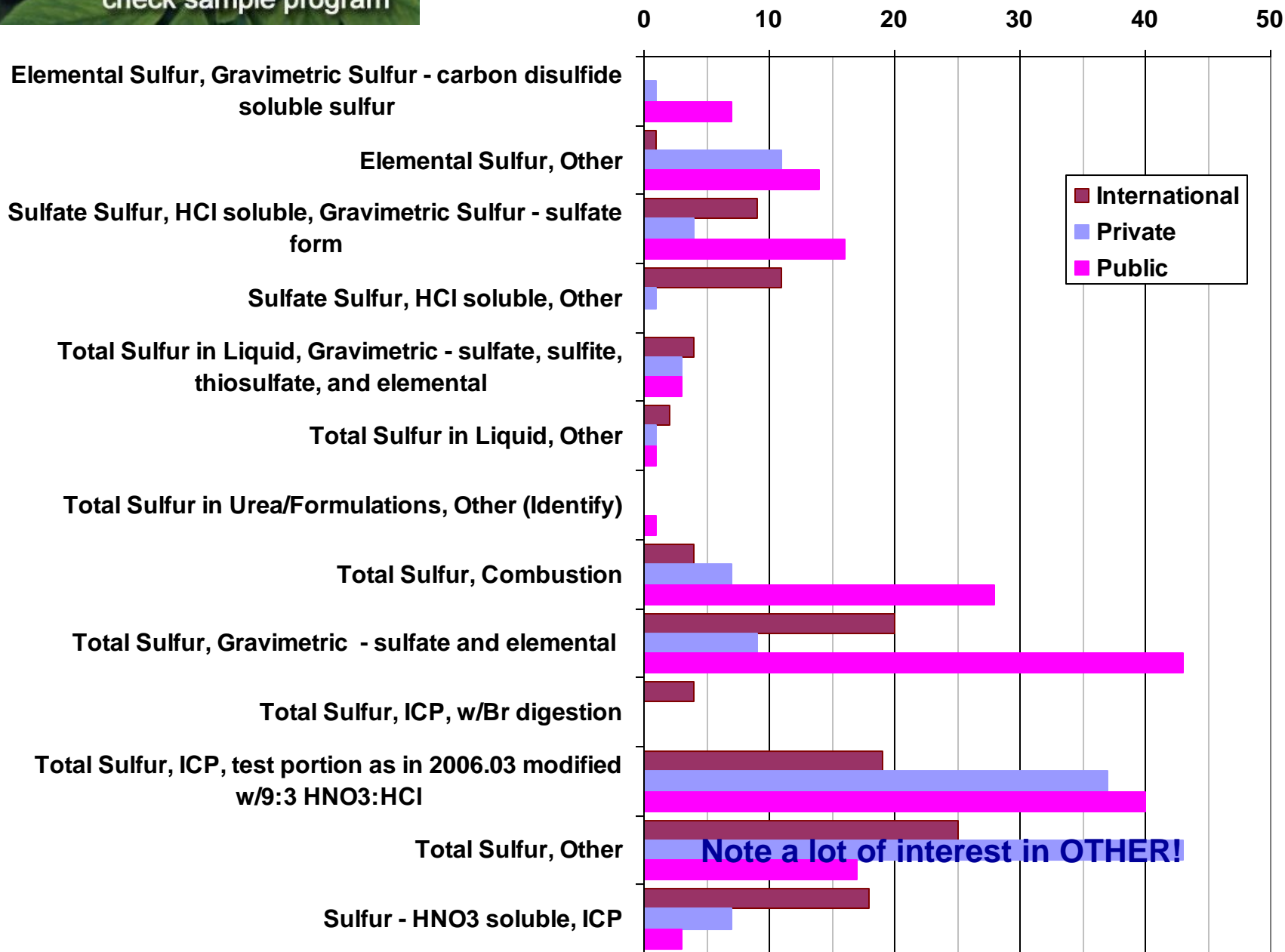
■ Private

■ Public

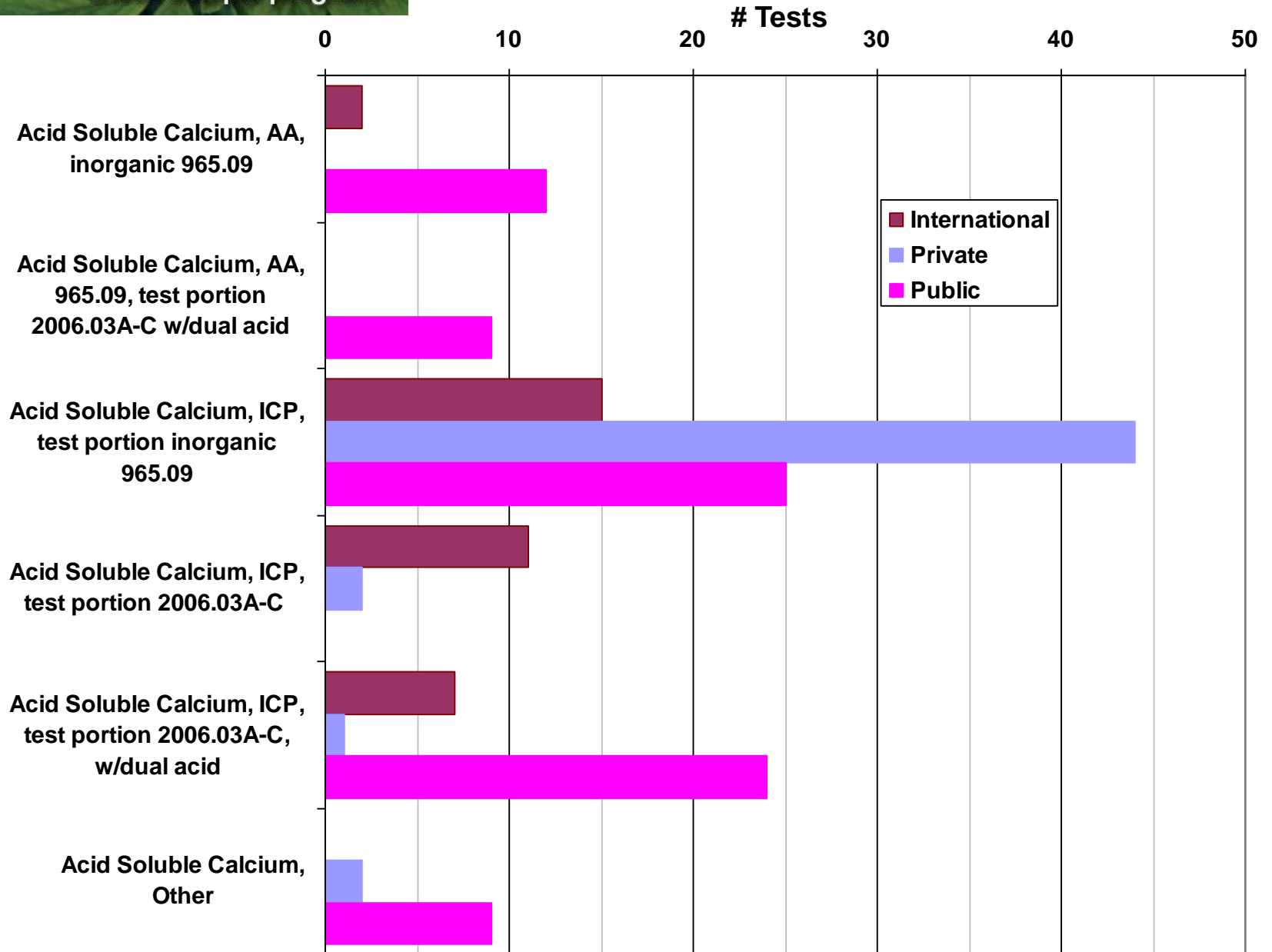
Not sure of Methods To Use



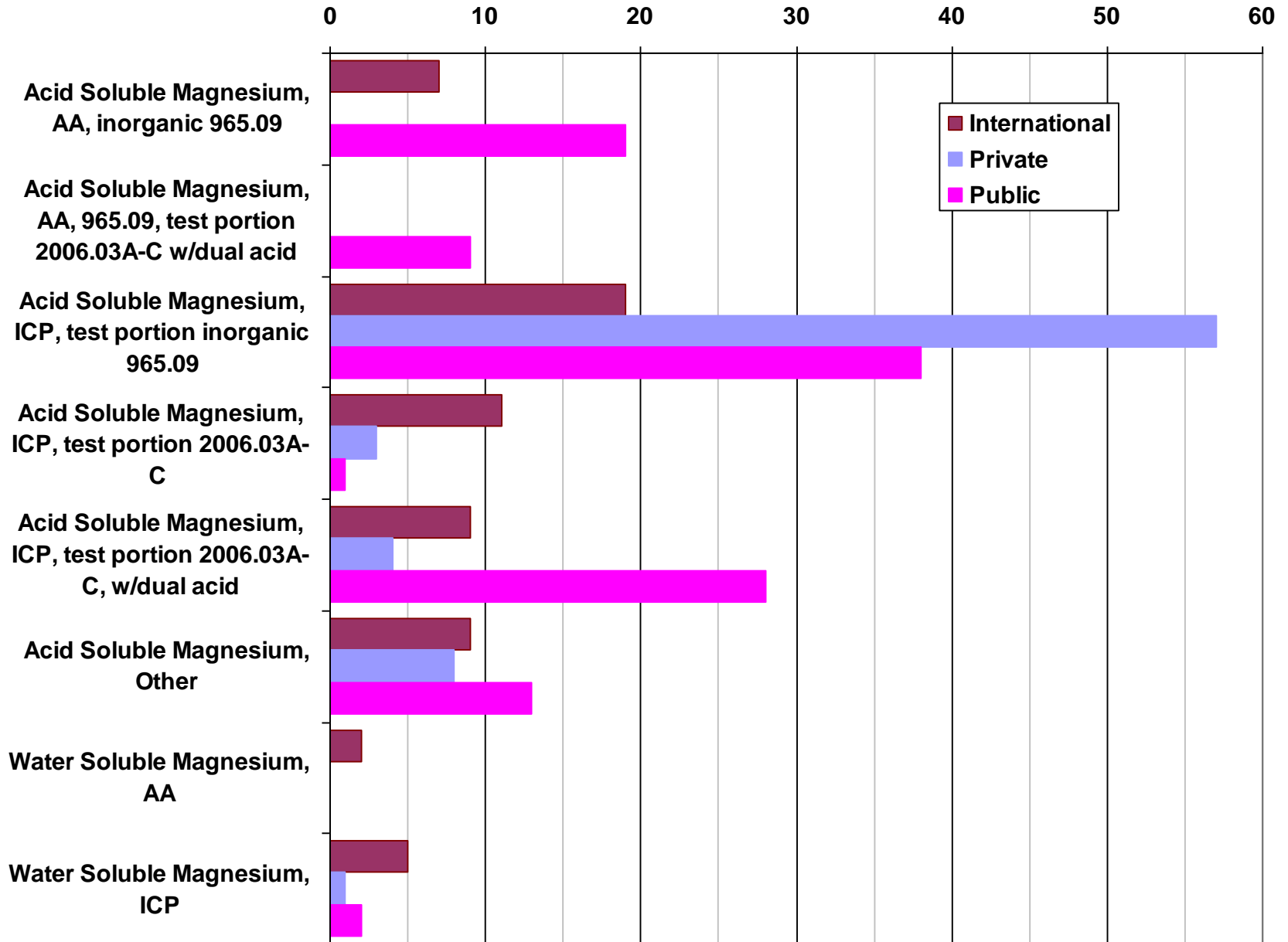
2016 Methods by Group: Sulfur



2016 Methods by Group: Calcium

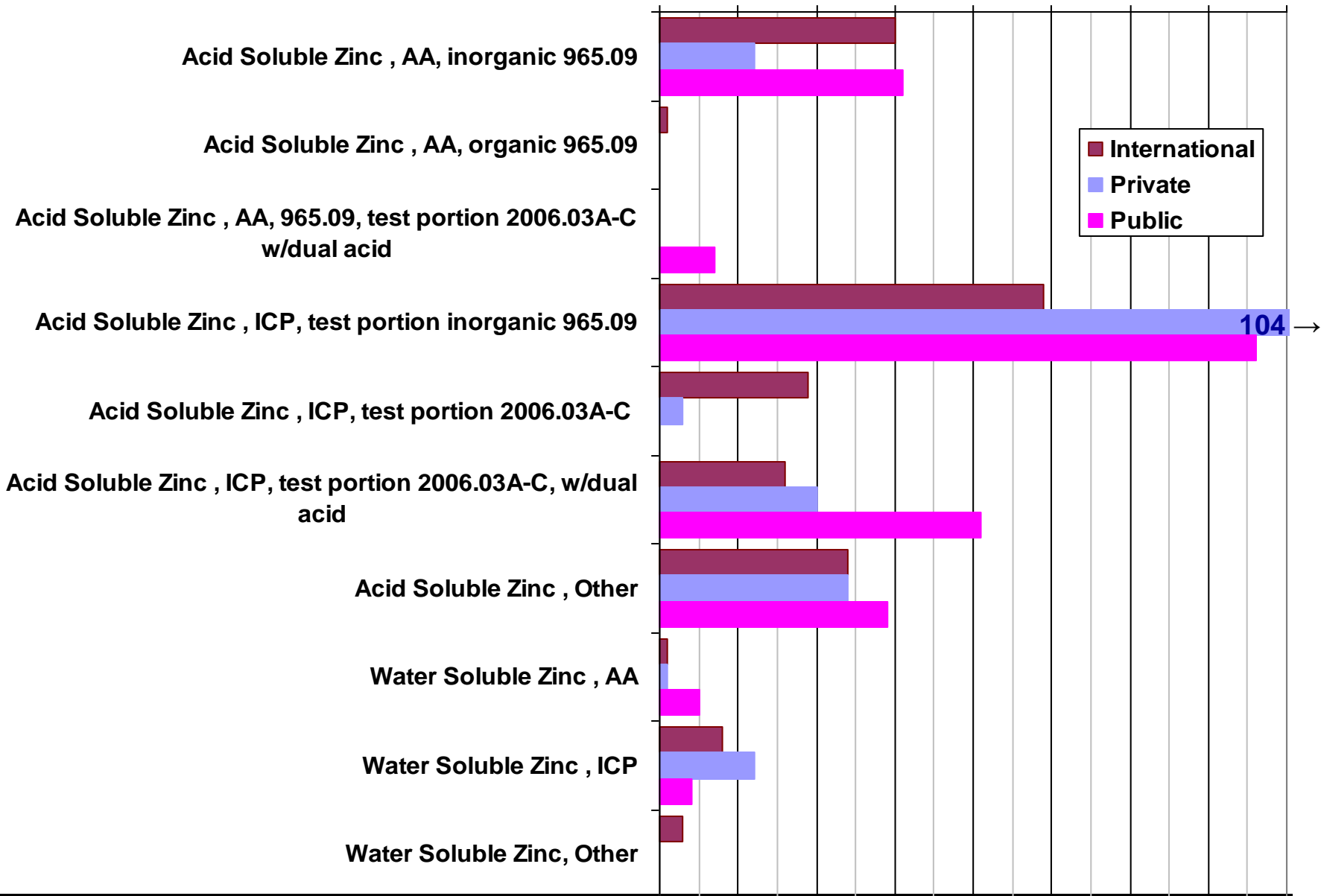


2016 Methods by Group: Magnesium



2016 Methods by Group: Zinc

0 10 20 30 40 50 60 70 80



Performance Against Guarantee

| Sample | Code | Analyte | Guarantee | Measured |
|---------------|--------|--------------|-----------|----------|
| Micro Mix | 160111 | Boron | 1.50% | 1.547 |
| | | Copper | 3% | 3.942 |
| | | Iron | 18% | 18.41 |
| | | Manganese | 7.50% | 8.249 |
| | | Molybdenum | 200 ppm | 195.2 |
| | | Zinc | 7% | 8.163 |
| Grade 24-25-4 | 160211 | Nitrogen | 24% | 24.56 |
| | | DA Phosphate | 25% | 24.81 |
| | | Potassium | 4% | 4.131 |
| Grade 5-2-0 | 160311 | Nitrogen | 5% | 5.442 |
| | | DA Phosphate | 2% | 4.231 |
| | | Potassium | 0% | 0.3872 |
| Liquid Thio S | 160411 | Potassium | 25% | 25.10% |
| | | Total Sulfur | 17% | 17.04 |
| Urea | 160511 | Nitrogen | 46% | 46.18 |
| Micros | 160512 | Total Sulfur | 9% | 12.10 |
| | | Boron | 1% | 1.048 |
| | | Copper | 1% | 1.838 |
| | | Manganese | 4% | 4.167 |
| | | Zinc | 20% | 20.04 |

Performance Against Guarantee

| Sample | Code | Analyte | Guarantee | Measured |
|-----------------|--------|--------------|-----------|----------|
| WS 25-5-15 | 160611 | Nitrogen | 25.00% | 24.23 |
| | | DA Phosphate | 5% | 4.929 |
| | | Potassium | 15% | 14.08 |
| | | Magnesium | 0.10% | 0.270 |
| | | Total Sulfur | 0.13% | 0.2055 |
| | | Boron | 0.025% | 0.0226 |
| | | Copper | 0.0125% | 0.0120 |
| | | Iron | 0.125% | 0.1118 |
| | | Manganese | 0.063% | 0.0529 |
| | | Molybdenum | 125 ppm | 107.8 |
| | | Zinc | 0.063% | 0.0574 |
| 12-12-12 Micros | 160711 | Nitrogen | 12% | 12.41 |
| | | DA Phosphate | 12% | 12.39 |
| | | Potassium | 12% | 12.26 |
| | | Total Sulfur | 9% | 12.42 |
| | | Boron | 0.1% | 0.1065 |
| | | Copper | 0.1% | 0.1774 |
| | | Iron | 0.5% | 0.9097 |
| | | Manganese | 0.4% | 0.418 |
| | | Molybdenum | 250 ppm | 9.214 |
| | | Zinc | 2% | 2.013 |

Performance Against Guarantee

| Sample | Code | Analyte | Guarantee | Measured |
|----------------|--------|--------------|-----------|----------|
| Liquid Organic | 160811 | Nitrogen | 5% | 5.185 |
| | | DA Phosphate | 20% | 19.39 |
| | | Potassium | 4% | 3.963 |
| | | Magnesium | 0.05% | 0.1222 |
| | | Boron | 0.02% | 0.0242 |
| | | Iron | 0.05% | 0.16 |
| | | Manganese | 0.2% | 0.2642 |
| | | Molybdenum | 30 ppm | 34.88 |
| | | Zinc | 0.03% | 0.0642 |
| MAP | 160911 | Nitrogen | 11% | 10.97 |
| | | DA Phosphate | 52% | 51.61 |
| MOP | 161011 | Potassium | 61% | 60.62 |
| | | Chlorine | 47% | 47.17 |
| ZnSO4 | 161012 | Total Sulfur | 17% | 16.22 |
| | | Zinc | 35% | 33.27 |
| Grade 32-0-10 | 161111 | Nitrogen | 32% | 32.34 |
| | | DA Phosphate | 0% | 0.0597 |
| | | Potassium | 10% | 10.13 |
| | | Iron | 2% | 0.00844 |
| MAP plus S | 161211 | Nitrogen | 12% | 12.06 |
| | | DA Phosphate | 40% | 41.4 |
| | | Total Sulfur | 10% | 9.492 |

Only 9 Labs participated →

What Would You Like to See?



MAGRUDER

Questions?