



2014 Lugert-Altus Irrigation District Deep Soil Sampling Program

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There has been no release of irrigation water to the LAID since 2011 due to ongoing drought and the lack of runoff in the North Fork watershed, and many cotton fields failed over multiple years. Working with Mr. Gary Strickland, Jackson County Extension Educator, in March and April project personnel identified several LAID producer-cooperators who agreed to participate in a deep sampling project. A total of 24 fields were deep sampled to 18" inches using this probe, and cooperators completed a survey for each field. This represented a total of 2,654 acres out of the approximately 40,000 acres located in the Irrigation District.

The objectives were to evaluate nitrate-N accumulation by depth (0-6" and 6-18"), as well as obtain a general snapshot of residual P and K fertility. In addition, we included salinity testing in the 0-6" increment. Some sampled fields were sub-surface drip irrigated but many were furrow watered. All samples were submitted to the OSU Soil, Water, and Forage Analysis Laboratory on campus.

Results indicate that substantial nitrate-N has accumulated in the soil profile in several fields due to the ongoing drought, continuing mineralization, and multiple crop failures (Table 1). The range in lb/acre of residual nitrate-N found in fields was 57 to 266. Most fields with extremely high residual N had experienced no biomass removal since 2010. Other fields have had some level of biomass removal (low yielding forage production and harvest and baling, and thus removal) and have somewhat lower values.

Average field size was 111 acres, with an average of 151 lb N/acre noted across all fields. Overall, in the 24 fields surveyed, a total of 417,445 lb N was directly measured (Table 2). When using 32-0-0 priced at \$350/ton (\$0.57/lb actual N), this survey indicated that the total value of residual N found in these fields was \$237,944. This averages about \$89/acre across sampled fields. The average per field total value of residual N was \$9,914. Since the Lugert-Altus Irrigation District consists of approximately 40,000 acres, and if these surveyed values from 24 fields (totaling 2654 acres) are accurate, then there is a total value of residual N of about \$3.56 million.

The high soil residual nitrate-N will be a challenge for cotton producers in the future, assuming irrigation will be available. The excessive accumulated N can exacerbate Verticillium wilt, increase cotton aphid populations, increase plant growth regulator need, delay maturity, challenge harvest aid performance, and ultimately negatively impact fiber quality (e.g. micronaire). This could result in cotton production losses, or extremely high expenses or both. It will also be a detriment to forage sorghum production, and possibly result in high nitrates in the harvested forage if extreme drought continues. Overall, salinity doesn't appear to be a major concern, with the exception of a few fields with high electrical conductivity.

24-Field Producer Survey Summary Results

Approximate acres represented in field? 2,654 total acres, 111 acres average per field

What is the lint yield goal for this field? 3 bales/acre average

Row spacing: 12 fields 38 inches (50%), 12 fields 40 inches (50%)

Irrigation type:

Subsurface drip: 7 fields (29.2%) Configuration: 3-76 inches, 4-80 inches

Furrow irrigation: 17 fields (70.8%)

Have you ever experienced any stand establishment issues or stand loss due to perceived salinity problems in this field? Yes 9 (37.5%) No 15 (62.5%)

Do you soil sample/test your fields? Yes (100%)

If yes, how often? 6 Not regular (25%) 18 annual (75%)

If yes, how deep? 6 (25%) Surface and subsoil
18 (75%) Surface only

Irrigation water tested? (Yes): 1 (4%)

If yes, what was ppm NO₃-N concentration (ppm): 0.1

| <u>Tillage System:</u> | <u>No-Till</u> | <u>Minimum-Till</u> | <u>Conventional Till</u> |
|------------------------|----------------|---------------------|--------------------------|
| 2010 | 8 | 5 | 11 |
| 2011 | 12 | 1 | 11 |
| 2012 | 12 | 12 | 0 |
| 2013 | 11 | 12 | 1 |



2014 Lugert-Altus Irrigation District Soil Sampling Project Results

| Field | Soil Sample for Routine Analysis | | | | | | Soil Sample for Salinity Testing | | | | | | | | | |
|----------------|----------------------------------|--------------------|---------------------|---------------------------|---------|---------|----------------------------------|-------------|-------|--------|--------|-------|---------|-----------|-----------|------|
| | 0-6" pH | 0-6" NO3-N lb/acre | 6-18" NO3-N lb/acre | total 0-18" NO3-N lb/acre | P index | K index | EC pH | Na umohs/cm | K ppm | Ca ppm | Mg ppm | B ppm | TSS ppm | PAR ratio | SAR ratio | |
| | 1 | 7.8 | 23 | 58 | 81 | 19 | 682 | 8.0 | 2,997 | 315 | 23 | 127 | 34 | 0.2 | 1,978 | 0.28 |
| 2 | 7.7 | 27 | 50 | 77 | 12 | 745 | 7.7 | 2,694 | 311 | 17 | 95 | 31 | 0.2 | 1,778 | 0.23 | 7.1 |
| 3 | 7.7 | 24 | 52 | 76 | 2 | 518 | 7.8 | 8,850 | 909 | 19 | 521 | 147 | 0.2 | 5,841 | 0.11 | 9.1 |
| 4 | 7.7 | 25 | 78 | 103 | 24 | 682 | 7.6 | 2,034 | 218 | 30 | 77 | 25 | 0.2 | 1,342 | 0.45 | 5.5 |
| 5 | 7.5 | 24 | 78 | 102 | 14 | 550 | 7.6 | 3,141 | 337 | 23 | 116 | 39 | 0.2 | 2,073 | 0.28 | 6.9 |
| 6 | 7.6 | 19 | 48 | 67 | 6 | 560 | 7.6 | 1,398 | 177 | 16 | 38 | 13 | 0.2 | 923 | 0.34 | 6.3 |
| 7 | 7.8 | 28 | 190 | 218 | 59 | 564 | 7.7 | 1,494 | 139 | 22 | 64 | 21 | 0.2 | 986 | 0.36 | 3.9 |
| 8 | 7.6 | 23 | 34 | 57 | 61 | 763 | 7.7 | 3,912 | 357 | 42 | 168 | 50 | 0.2 | 2,582 | 0.43 | 6.2 |
| 9 | 7.9 | 34 | 170 | 204 | 26 | 744 | 7.6 | 2,391 | 256 | 25 | 88 | 27 | 0.2 | 1,578 | 0.35 | 6.1 |
| 10 | 7.5 | 32 | 72 | 104 | 42 | 812 | 7.6 | 2,163 | 208 | 30 | 88 | 28 | 0.2 | 1,428 | 0.42 | 4.9 |
| 11 | 7.5 | 28 | 176 | 204 | 65 | 801 | 7.3 | 1,722 | 175 | 27 | 65 | 22 | 0.2 | 1,137 | 0.43 | 4.8 |
| 12 | 7.7 | 83 | 178 | 261 | 50 | 809 | 7.7 | 4,710 | 461 | 37 | 196 | 61 | 0.2 | 3,109 | 0.35 | 7.4 |
| 13 | 7.3 | 61 | 130 | 191 | 76 | 527 | 7.3 | 3,408 | 298 | 45 | 144 | 52 | 0.2 | 2,249 | 0.48 | 5.4 |
| 14 | 7.7 | 26 | 72 | 98 | 31 | 778 | 7.7 | 1,608 | 104 | 26 | 94 | 17 | 0.2 | 1,061 | 0.38 | 2.6 |
| 15 | 7.7 | 31 | 160 | 191 | 103 | 545 | 7.8 | 1,932 | 220 | 20 | 64 | 21 | 0.2 | 1,275 | 0.33 | 6.1 |
| 16 | 7.6 | 67 | 170 | 237 | 53 | 586 | 7.6 | 8,250 | 814 | 31 | 389 | 107 | 0.2 | 5,445 | 0.21 | 9.4 |
| 17 | 7.7 | 26 | 70 | 96 | 54 | 826 | 7.7 | 4,101 | 426 | 31 | 178 | 53 | 0.4 | 2,707 | 0.31 | 7.2 |
| 18 | 7.6 | 38 | 142 | 180 | 49 | 802 | 7.7 | 4,524 | 429 | 46 | 202 | 58 | 0.2 | 2,986 | 0.43 | 6.8 |
| 19 | 7.6 | 21 | 62 | 83 | 46 | 529 | 7.7 | 1,332 | 122 | 31 | 53 | 18 | 0.2 | 879 | 0.55 | 3.7 |
| 20 | 6.6 | 24 | 152 | 176 | 56 | 553 | 6.8 | 2,766 | 227 | 56 | 114 | 42 | 0.2 | 1,826 | 0.67 | 4.6 |
| 21 | 7.5 | 42 | 150 | 192 | 37 | 627 | 7.7 | 3,303 | 329 | 30 | 127 | 39 | 0.2 | 2,180 | 0.35 | 6.5 |
| 22 | 7.8 | 38 | 116 | 154 | 69 | 851 | 7.7 | 2,640 | 303 | 29 | 85 | 29 | 0.2 | 1,742 | 0.41 | 7.2 |
| 23 | 7.7 | 70 | 196 | 266 | 18 | 675 | 7.7 | 4,224 | 492 | 27 | 148 | 47 | 0.2 | 2,788 | 0.29 | 9.0 |
| 24 | 7.9 | 77 | 128 | 205 | 19 | 672 | 7.9 | 5,001 | 526 | 19 | 211 | 57 | 0.2 | 3,301 | 0.18 | 8.3 |
| Average | 7.6 | 37 | 114 | 151 | 41 | 675 | 7.6 | 3,358 | 340 | 29 | 144 | 43 | 0.2 | 2,216 | 0 | 6 |



**2014 Lugert-Altus Irrigation District Soil Sampling Project Results
Value of Residual Soil Nitrate-N Observed**

| Field | Acres | Total 0-18" NO3-N lb/acre | Total N lb/field | N value \$/field |
|----------------|-------------|------------------------------|---------------------|---------------------|
| 1 | 80 | 81 | 6,480 | 3,694 |
| 2 | 73 | 77 | 5,621 | 3,204 |
| 3 | 145 | 76 | 11,020 | 6,281 |
| 4 | 123 | 103 | 12,669 | 7,221 |
| 5 | 72 | 102 | 7,344 | 4,186 |
| 6 | 90 | 67 | 6,030 | 3,437 |
| 7 | 137 | 218 | 29,866 | 17,024 |
| 8 | 110 | 57 | 6,270 | 3,574 |
| 9 | 73 | 204 | 14,892 | 8,488 |
| 10 | 145 | 104 | 15,080 | 8,596 |
| 11 | 125 | 204 | 25,500 | 14,535 |
| 12 | 153 | 261 | 39,933 | 22,762 |
| 13 | 75 | 191 | 14,325 | 8,165 |
| 14 | 130 | 98 | 12,740 | 7,262 |
| 15 | 77 | 191 | 14,707 | 8,383 |
| 16 | 150 | 237 | 35,550 | 20,264 |
| 17 | 27 | 96 | 2,592 | 1,477 |
| 18 | 73 | 180 | 13,140 | 7,490 |
| 19 | 195 | 83 | 16,185 | 9,225 |
| 20 | 23 | 176 | 4,013 | 2,287 |
| 21 | 152 | 192 | 29,184 | 16,635 |
| 22 | 97 | 154 | 14,938 | 8,515 |
| 23 | 195 | 266 | 51,897 | 29,581 |
| 24 | 134 | 205 | 27,470 | 15,658 |
| | | | | |
| Total | 2654 | -- | 417,445 | 237,944 |
| Average | 111 | 151 | 17,394 | 9,914 |

N value at \$350/ton of 32-0-0
is \$0.57/lb actual N