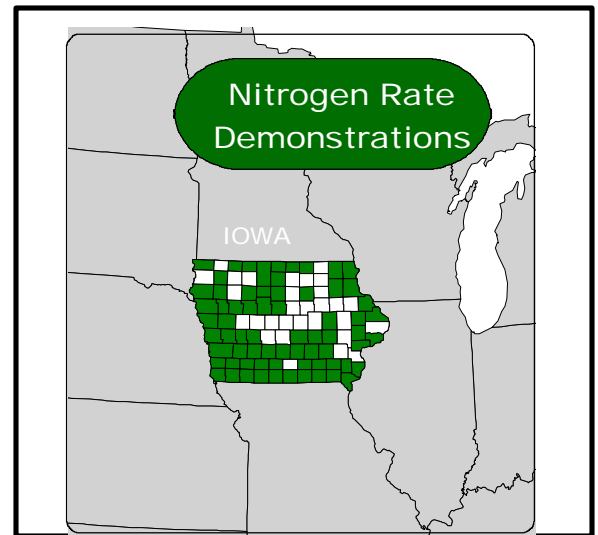


# Iowa 2000-2003 On-Farm Nitrogen Rate Trials



## Nitrogen Rate Trial Methods

- Over a four-year period, 110 on-farm trials compared a producer's normal N rate and a reduced rate (approximately 50 lb N/acre less) in alternating strips replicated at least four times.
- Each strip was 8 to 24 rows wide and went the length of the field (usually >1600).
- Combines equipped with calibrated yield monitors and global positioning systems measured grain yields in each strip.
- The fields were managed by the producer (except N) and were representative of management practices used in the Corn Belt.
- No manure was applied to the fields in recent years and the previous crop was soybean.

## Conclusions

- Mean rates of fertilization were 144 lb N/acre for the normal rate and 94 lb N/acre for the reduced rate. The corresponding mean yields were 177 and 173 bushels/acre.
- The mean normal rate of the producers (144 lb N/acre) was less than the mean recommended rate of 168 lb N/acre ( $173 \times 1.2 - 40 = 168$ ) based on yield goals and credits.
- The reduced rate was as profitable as the producer's normal rate because reductions in value of crop were approximately equal to reductions in amounts producers paid for the extra N.
- Of the additional N applied, only 3 lb N/acre was accounted for in the additional grain harvested. The remainder was left in the field and susceptible for loss to the environment.
- The results suggest that N rates can be reduced well below those normally used.
- On-farm evaluations of N rates make it possible to improve N management practices and reduce amounts of unutilized N. Major benefits of on-farm evaluations should include reductions in environmental degradation and the need for costly regulations to protect the environment.

For more information contact the Iowa Soybean Association at 515-251-8640 or <http://www.iasoybeans.com/>.

| Site | County                  | Year | Fertilizer N <sup>1</sup> |             | Yield               |             |
|------|-------------------------|------|---------------------------|-------------|---------------------|-------------|
|      |                         |      | Reduced Rate              | Normal Rate | Reduced Rate        | Normal Rate |
|      |                         |      | ----- lb N/acre -----     |             | ----- bu/acre ----- |             |
| 1    | Marshall <sup>2</sup>   | 2002 | 43                        | 83          | 198                 | 217         |
| 2    | Linn                    | 2003 | 50                        | 100         | 176                 | 177         |
| 3    | Black Hawk              | 2002 | 60                        | 110         | 145                 | 150         |
| 4    | Black Hawk              | 2003 | 60                        | 110         | 114                 | 118         |
| 5    | Chickasaw               | 2003 | 67                        | 127         | 153                 | 154         |
| 6    | Chickasaw               | 2002 | 67                        | 127         | 183                 | 199         |
| 7    | Osceola <sup>2</sup>    | 2002 | 67                        | 117         | 155                 | 163         |
| 8    | Buchanan                | 2001 | 70                        | 125         | 175                 | 179         |
| 9    | Black Hawk <sup>2</sup> | 2001 | 70                        | 120         | 163                 | 168         |
| 10   | Tama                    | 2002 | 75                        | 125         | 194                 | 199         |
| 11   | Cerro Gordo             | 2002 | 75                        | 125         | 187                 | 188         |
| 12   | Buena Vista             | 2001 | 75                        | 125         | 150                 | 152         |
| 13   | Buchanan                | 2002 | 75                        | 125         | 174                 | 182         |
| 14   | Delaware                | 2001 | 75                        | 125         | 166                 | 166         |
| 15   | Story                   | 2002 | 75                        | 140         | 182                 | 208         |
| 16   | Boone <sup>2</sup>      | 2001 | 75                        | 125         | 133                 | 138         |
| 17   | Dallas <sup>2</sup>     | 2001 | 75                        | 125         | 137                 | 139         |
| 18   | Boone <sup>2</sup>      | 2001 | 75                        | 125         | 144                 | 148         |
| 19   | Lucas <sup>2</sup>      | 2001 | 75                        | 125         | 146                 | 156         |
| 20   | Story <sup>2</sup>      | 2001 | 75                        | 125         | 147                 | 158         |
| 21   | Floyd <sup>2</sup>      | 2001 | 75                        | 125         | 170                 | 178         |
| 22   | Osceola <sup>2</sup>    | 2002 | 75                        | 125         | 128                 | 136         |
| 23   | Sioux <sup>2</sup>      | 2002 | 75                        | 125         | 142                 | 144         |
| 24   | Sioux <sup>2</sup>      | 2002 | 75                        | 125         | 148                 | 150         |
| 25   | Sioux <sup>2</sup>      | 2002 | 75                        | 125         | 161                 | 159         |
| 26   | Greene <sup>2</sup>     | 2002 | 75                        | 125         | 160                 | 163         |
| 27   | Greene <sup>2</sup>     | 2002 | 75                        | 125         | 174                 | 178         |

| Site | County                  | Year | Fertilizer N <sup>1</sup> |             | Yield        |             |
|------|-------------------------|------|---------------------------|-------------|--------------|-------------|
|      |                         |      | Reduced Rate              | Normal Rate | Reduced Rate | Normal Rate |
| 28   | Greene <sup>2</sup>     | 2002 | 75                        | 125         | 186          | 192         |
| 29   | Boone <sup>2</sup>      | 2003 | 75                        | 125         | 186          | 191         |
| 30   | Boone <sup>2</sup>      | 2003 | 75                        | 125         | 194          | 196         |
| 31   | Boone <sup>2</sup>      | 2003 | 75                        | 125         | 185          | 190         |
| 32   | Grundy                  | 2002 | 79                        | 129         | 169          | 173         |
| 33   | Black Hawk              | 2001 | 80                        | 130         | 188          | 193         |
| 34   | Grundy                  | 2002 | 80                        | 125         | 200          | 204         |
| 35   | Grundy                  | 2001 | 80                        | 130         | 144          | 145         |
| 36   | Chickasaw               | 2001 | 80                        | 130         | 148          | 160         |
| 37   | Palo Alto               | 2003 | 80                        | 130         | 171          | 173         |
| 38   | Palo Alto               | 2002 | 80                        | 130         | 156          | 162         |
| 39   | Buchanan <sup>2</sup>   | 2000 | 80                        | 110         | 144          | 147         |
| 40   | Clinton <sup>2</sup>    | 2000 | 80                        | 130         | 184          | 197         |
| 41   | Louisa <sup>2</sup>     | 2000 | 80                        | 130         | 218          | 216         |
| 42   | Marshall <sup>2</sup>   | 2001 | 80                        | 130         | 172          | 175         |
| 43   | Buchanan <sup>2</sup>   | 2001 | 80                        | 110         | 180          | 188         |
| 44   | Washington <sup>2</sup> | 2001 | 80                        | 130         | 229          | 234         |
| 45   | Carroll <sup>2</sup>    | 2002 | 80                        | 135         | 166          | 170         |
| 46   | Bremer <sup>2</sup>     | 2003 | 82                        | 132         | 138          | 139         |
| 47   | Sioux <sup>2</sup>      | 2003 | 83                        | 137         | 170          | 169         |
| 48   | Sioux <sup>2</sup>      | 2003 | 83                        | 137         | 167          | 165         |
| 49   | Howard                  | 2002 | 85                        | 125         | 188          | 198         |
| 50   | Howard                  | 2002 | 85                        | 125         | 200          | 207         |
| 51   | Chickasaw               | 2001 | 85                        | 145         | 146          | 153         |
| 52   | Mitchell <sup>2</sup>   | 2001 | 85                        | 110         | 170          | 170         |
| 53   | Buchanan                | 2001 | 86                        | 136         | 170          | 176         |
| 54   | Dallas <sup>2</sup>     | 2002 | 86                        | 136         | 135          | 136         |
| 55   | Buchanan                | 2001 | 90                        | 140         | 199          | 200         |
| 56   | Bremer                  | 2001 | 90                        | 135         | 192          | 190         |

| Site | County                  | Year | Fertilizer N <sup>1</sup> |             | Yield        |             |
|------|-------------------------|------|---------------------------|-------------|--------------|-------------|
|      |                         |      | Reduced Rate              | Normal Rate | Reduced Rate | Normal Rate |
| 57   | Chickasaw <sup>2</sup>  | 2002 | 90                        | 140         | 149          | 152         |
| 58   | Chickasaw <sup>2</sup>  | 2003 | 90                        | 140         | 175          | 184         |
| 59   | Palo Alto               | 2001 | 91                        | 141         | 154          | 159         |
| 60   | Buchanan <sup>2</sup>   | 2001 | 93                        | 128         | 185          | 184         |
| 61   | Hardin                  | 2002 | 95                        | 145         | 193          | 194         |
| 62   | Hardin                  | 2002 | 95                        | 145         | 187          | 193         |
| 63   | Hardin                  | 2002 | 95                        | 145         | 199          | 202         |
| 64   | Buchanan <sup>2</sup>   | 2002 | 95                        | 145         | 209          | 214         |
| 65   | Clay                    | 2002 | 100                       | 200         | 170          | 175         |
| 66   | Boone                   | 2001 | 100                       | 150         | 174          | 177         |
| 67   | Boone                   | 2001 | 100                       | 150         | 180          | 183         |
| 68   | Floyd                   | 2000 | 100                       | 150         | 147          | 148         |
| 69   | Linn                    | 2003 | 100                       | 150         | 177          | 179         |
| 70   | Polk                    | 2002 | 100                       | 150         | 187          | 186         |
| 71   | Floyd                   | 2002 | 100                       | 150         | 192          | 194         |
| 72   | Cerro Gordo             | 2000 | 100                       | 150         | 158          | 165         |
| 73   | Buchanan                | 2000 | 100                       | 150         | 156          | 156         |
| 74   | Howard                  | 2001 | 100                       | 130         | 135          | 137         |
| 75   | Buchanan                | 2000 | 100                       | 150         | 146          | 146         |
| 76   | Franklin                | 2001 | 100                       | 150         | 153          | 162         |
| 77   | Bremer                  | 2001 | 100                       | 139         | 159          | 164         |
| 78   | Washington <sup>2</sup> | 2001 | 102                       | 154         | 179          | 188         |
| 79   | Buchanan                | 2001 | 105                       | 155         | 199          | 204         |
| 80   | Buchanan                | 2001 | 105                       | 155         | 179          | 184         |
| 81   | Black Hawk              | 2002 | 105                       | 155         | 193          | 195         |
| 82   | Chickasaw               | 2001 | 105                       | 155         | 227          | 229         |
| 83   | Buchanan                | 2002 | 106                       | 156         | 217          | 225         |
| 84   | Greene                  | 2001 | 110                       | 160         | 149          | 153         |
| 85   | Floyd                   | 2001 | 110                       | 160         | 161          | 162         |
| 86   | Black Hawk              | 2002 | 111                       | 161         | 192          | 193         |
| 87   | Bremer                  | 2002 | 112                       | 162         | 205          | 206         |

| Site        | County                  | Year | Fertilizer N <sup>1</sup> |             | Yield        |             |
|-------------|-------------------------|------|---------------------------|-------------|--------------|-------------|
|             |                         |      | Reduced Rate              | Normal Rate | Reduced Rate | Normal Rate |
| 88          | Bremer <sup>2</sup>     | 2001 | 115                       | 165         | 183          | 186         |
| 89          | Bremer <sup>2</sup>     | 2002 | 115                       | 165         | 191          | 197         |
| 90          | Washington <sup>2</sup> | 2002 | 115                       | 170         | 205          | 225         |
| 91          | Washington <sup>2</sup> | 2002 | 115                       | 170         | 190          | 220         |
| 92          | Black Hawk              | 2001 | 116                       | 166         | 176          | 178         |
| 93          | Chickasaw               | 2002 | 117                       | 167         | 142          | 141         |
| 94          | Cerro Gordo             | 2001 | 120                       | 170         | 158          | 155         |
| 95          | Story                   | 2001 | 120                       | 170         | 165          | 167         |
| 96          | Delaware                | 2001 | 120                       | 170         | 183          | 184         |
| 97          | Story                   | 2003 | 130                       | 180         | 167          | 166         |
| 98          | Franklin                | 2000 | 130                       | 180         | 163          | 165         |
| 99          | Chickasaw               | 2001 | 130                       | 180         | 164          | 167         |
| 100         | Buchanan                | 2000 | 130                       | 180         | 155          | 159         |
| 101         | Story                   | 2003 | 130                       | 180         | 213          | 218         |
| 102         | Story                   | 2001 | 130                       | 180         | 172          | 171         |
| 103         | Johnson                 | 2002 | 130                       | 180         | 195          | 193         |
| 104         | Story                   | 2001 | 135                       | 185         | 170          | 172         |
| 105         | Buchanan                | 2000 | 140                       | 190         | 146          | 149         |
| 106         | Story                   | 2002 | 146                       | 196         | 221          | 222         |
| 107         | Story                   | 2002 | 146                       | 196         | 211          | 214         |
| 108         | Story                   | 2002 | 146                       | 196         | 204          | 209         |
| 109         | Grundy                  | 2001 | 146                       | 206         | 140          | 141         |
| 110         | Buchanan                | 2000 | 150                       | 200         | 182          | 183         |
| <b>Mean</b> |                         |      | <b>94</b>                 | <b>144</b>  | <b>173</b>   | <b>177</b>  |

<sup>1</sup> Any nitrogen applied with P is included in rate.

<sup>2</sup> Nitrogen applied after crop emerged.

**Major Conclusions:**  
 --The reduced rate was as profitable as the producer's normal rate because reductions in value of crop were approximately equal to reductions in amounts producers paid for the extra N.  
 --On-farm evaluations of N rates make it possible to improve N management practices and reduce amounts of unutilized N.  
 Major benefits of on-farm evaluations should include reductions in environmental degradation and the need for costly regulations to protect the environment.