

Table 2: Effect of P and Zn fertilization levels on LAI, total chlorophyll and leaf P and Zn contents at 85 days after planting (DAP) and NAR during the 85-95 DAP in the two seasons.

| Main effects and interactions | Leaf area index (LAI) | | Net assimilation rate (NAR) (mg/cm ² /day) | | Total chlorophyll content (mg/g) | | Leaf Zn content (ppm) | | Leaf P content (%) | |
|--|--|-----------|---|-----------|----------------------------------|-----------|-----------------------|-----------|--------------------|-----------|
| | 2003/2004 | 2003/2004 | 2003/2004 | 2003/2004 | 2003/2004 | 2003/2004 | 2003/2004 | 2003/2004 | 2003/2004 | 2003/2004 |
| | P- levels (P₂O₅ kg/fad) | | | | | | | | | |
| 15kg | 3.434b | 3.195b | 2.814b | 2.578b | 37.950b | 37.259b | 22.408a | 22.808a | 0.211c | 0.223b |
| 30kg | 3.713a | 3.471a | 3.212a | 2.990a | 40.229a | 38.898a | 21.300a | 22.050a | 0.265a | 0.256a |
| 45kg | 3.672a | 3.425a | 3.278a | 3.146a | 39.993a | 39.083a | 18.008b | 18.700b | 0.250b | 0.233b |
| Zn-rates (ZnSO₄/fad) | | | | | | | | | | |
| 4kg | 3.434c | 3.148c | 2.710c | 2.434c | 37.698c | 37.044c | 15.567c | 15.011c | 0.261a | 0.264a |
| 8kg | 3.583b | 3.372b | 3.071b | 2.937b | 39.557b | 38.438b | 20.522b | 21.544b | 0.266a | 0.261a |
| 12kg | 3.834a | 3.589a | 3.590a | 3.386a | 40.881a | 39.761a | 22.856a | 23.933a | 0.242b | 0.250b |
| 16kg | 3.572b | 3.346b | 3.034b | 2.861b | 39.427b | 38.410b | 23.344a | 24.256a | 0.198c | 0.174c |
| Interaction P x Zn | NS | * | ** | * | NS | * | * | * | * | * |

Table 3: Interaction effect between P and Zn-levels on LAI, total chlorophyll and leaf P and Zn contents at 85 days after planting (DAP) and NAR during the 85-95 DAP in the two seasons.

| Interactions | | LAI | | NAR (mg/cm ² /day) | | Total chlorophyll content (mg/g) | | Leaf Zn content (ppm) | | Leaf P content (%) | |
|--|--------------------------------------|-----------|-----------|----------------------------------|-----------|--|-----------|--------------------------|-----------|-----------------------|-----------|
| | | 2003/2004 | 2004/2005 | 2003/2004 | 2004/2005 | 2003/2004 | 2004/2005 | 2003/2004 | 2004/2005 | 2003/2004 | 2004/2005 |
| P-levels (P ₂ O ₅ /fad) | Zn-rates (ZnSO ₄ /fad) | | | | | | | | | | |
| | 4 kg | 3.253a | 2.950f | 2.527f | 2.257f | 36.110a | 35.850g | 16.667ef | 15.667f | 0.228bc | 0.244c |
| | 8 kg | 3.410a | 3.243e | 2.733e | 2.597e | 38.143a | 37.380ef | 22.767bc | 23.667bc | 0.228bc | 0.243c |
| | 12 kg | 3.640a | 3.423bc | 3.123bc | 2.953cd | 39.660a | 38.493d | 24.767a | 25.967a | 0.208cd | 0.225c |
| | 16 kg | 3.433a | 3.163e | 2.873de | 2.503e | 37.887a | 37.313f | 25.433a | 25.933a | 0.180e | 0.179d |
| 15 kg | 4 kg | 3.563a | 3.227e | 2.777e | 2.427e | 38.523a | 37.733e | 15.267fg | 15.167f | 0.279a | 0.283ab |
| | 8 kg | 3.720a | 3.497b | 3.200b | 2.960cd | 40.647a | 38.807cd | 21.433cd | 22.400cd | 0.281a | 0.274ab |
| | 12 kg | 3.870a | 3.653a | 3.843a | 3.647a | 41.500a | 40.413a | 24.000ab | 25.000ab | 0.275a | 0.289a |
| | 16 kg | 3.697a | 3.507b | 3.027cd | 2.927d | 40.247a | 38.637d | 24.500a | 25.633a | 0.225bc | 0.177d |
| 30 kg | 4 kg | 3.487a | 3.267de | 2.827e | 2.620e | 38.460a | 37.550ef | 14.767g | 14.200f | 0.276a | 0.265b |
| | 8 kg | 3.620a | 3.377c | 3.280b | 3.253b | 39.880a | 39.127bc | 17.367e | 18.567e | 0.289a | 0.265b |
| | 12 kg | 3.993a | 3.690a | 3.803a | 3.557a | 41.483a | 40.377a | 19.800d | 20.833d | 0.243b | 0.236c |
| | 16 kg | 3.587a | 3.367cd | 3.203b | 3.153bc | 40.147a | 39.280b | 20.100d | 21.200d | 0.190de | 0.164d |
| 45 kg | 4 kg | 3.487a | 3.267de | 2.827e | 2.620e | 38.460a | 37.550ef | 14.767g | 14.200f | 0.276a | 0.265b |
| | 8 kg | 3.620a | 3.377c | 3.280b | 3.253b | 39.880a | 39.127bc | 17.367e | 18.567e | 0.289a | 0.265b |
| | 12 kg | 3.993a | 3.690a | 3.803a | 3.557a | 41.483a | 40.377a | 19.800d | 20.833d | 0.243b | 0.236c |
| | 16 kg | 3.587a | 3.367cd | 3.203b | 3.153bc | 40.147a | 39.280b | 20.100d | 21.200d | 0.190de | 0.164d |

Table 4: Effect of P and Zn fertilization levels on 1000-grain weight, grain and straw yields and grain P and Zn contents at harvest in the two seasons.

| Main effects and interactions | 1000-grain weight (g) | | Grain yield (ton/fad) | | Straw yield (ton/fad) | | Grain Zn content (ppm) | | Grain P content (%) | |
|--|--------------------------|-----------|--------------------------|-----------|--------------------------|-----------|---------------------------|-----------|------------------------|-----------|
| | 2003/2004 | 2004/2005 | 2003/2004 | 2004/2005 | 2003/2004 | 2004/2005 | 2003/2004 | 2004/2005 | 2003/2004 | 2004/2005 |
| P- levels (P₂O₅ kg/fad) | | | | | | | | | | |
| 15 kg | 38.591c | 37.450c | 1.319b | 1.223b | 2.412b | 2.341b | 25.035a | 26.385a | 0.247b | 0.277b |
| 30 kg | 42.262a | 41.175a | 1.900a | 1.721a | 2.959a | 2.785a | 23.708a | 25.649a | 0.293a | 0.323a |
| 45 kg | 41.406b | 40.108b | 1.864a | 1.684a | 2.897a | 2.658a | 20.333b | 21.80b | 0.295a | 0.320a |
| Zn-rates (ZnSO₄/fad) | | | | | | | | | | |
| 4 kg | 39.913a | 38.114c | 1.526c | 1.337c | 2.561c | 2.400c | 18.230c | 19.636c | 0.301a | 0.333a |
| 8 kg | 40.686b | 39.929b | 1.707b | 1.538b | 2.736b | 2.521b | 22.993b | 24.643b | 0.293ab | 0.325a |
| 12 kg | 41.792a | 40.516a | 1.861a | 1.709a | 3.060a | 2.863a | 25.056a | 26.600a | 0.291b | 0.315b |
| 16 kg | 40.620b | 39.752b | 1.684b | 1.588b | 2.667b | 2.594b | 25.822a | 27.567a | 0.227c | 0.253c |
| Interaction P x Zn | NS | * | * | ** | * | ** | * | * | * | * |

Table 5: Interaction effect between P and Zn-levels on 1000-grain weight, grain and straw yields and grain P and Zn contents at harvest in the two seasons.

| Interactions | | 1000-grain weight (g) | | Grain yield (ton/fad) | | Straw yield (ton/fad) | | Grain Zn content (ppm) | | Grain P content (%) | |
|---|-----------------------------------|-----------------------|-----------|-----------------------|-----------|-----------------------|-----------|------------------------|-----------|---------------------|-----------|
| P-levels (P ₂ O ₅ /fad) | Zn-rates (ZnSO ₄ /fad) | 2003/2004 | 2004/2005 | 2003/2004 | 2004/2005 | 2003/2004 | 2004/2005 | 2003/2004 | 2004/2005 | 2003/2004 | 2004/2005 |
| 15 kg | 4 kg | 38.133a | 36.377e | 1.207h | 1.180e | 2.362e | 2.232f | 19.557f | 20.540f | 0.269d | 0.300c |
| | 8 kg | 38.587a | 37.730cd | 1.297g | 1.210e | 2.372e | 2.345ef | 25.617c | 26.867bc | 0.260de | 0.296c |
| | 12 kg | 39.217a | 38.273c | 1.493f | 1.293de | 2.610d | 2.416de | 27.133ab | 28.533ab | 0.242ef | 0.269d |
| | 16 kg | 38.427a | 37.420d | 1.280gh | 1.210e | 2.304e | 2.372ef | 27.833a | 29.600a | 0.216g | 0.241e |
| 30 kg | 4 kg | 41.570a | 39.820b | 1.663e | 1.427d | 2.732cd | 2.605bc | 18.000fg | 19.867fg | 0.314abc | 0.345a |
| | 8 kg | 42.083a | 41.660a | 1.943bc | 1.767bc | 2.980b | 2.662bc | 23.863d | 25.897cd | 0.306bc | 0.339ab |
| | 12 kg | 43.443a | 41.830a | 2.080a | 1.897ab | 3.245a | 3.122a | 26.233bc | 28.100ab | 0.327a | 0.352a |
| | 16 kg | 41.950a | 41.390a | 1.913cd | 1.793b | 2.880bc | 2.749b | 26.733abc | 28.733a | 0.225fg | 0.257de |
| 45 kg | 4 kg | 40.037a | 38.147c | 1.707e | 1.403d | 2.590d | 2.363ef | 17.133g | 18.500g | 0.322ab | 0.354a |
| | 8 kg | 41.387a | 40.397b | 1.880cd | 1.637c | 2.856bc | 2.554cd | 19.500f | 21.167f | 0.314abc | 0.340ab |
| | 12 kg | 42.717a | 41.443a | 2.010ab | 1.937a | 3.325a | 3.052a | 21.800e | 23.167e | 0.303c | 0.324b |
| | 16 kg | 41.483a | 40.447b | 1.860d | 1.760bc | 2.818bc | 2.662bc | 22.900de | 24.367de | 0.240f | 0.261d |

