

Table 4. Effect of irrigation levels and safety materials on vegetative growth of snap bean during 2011 and 2012 seasons

| Treatments | | Plant length cm | | No. of. leaves/ plant | | Leaf area cm ² | | Fresh weight g / plant | | Dry weight g / plant | |
|-----------------------------------|-------------------|-----------------|--------------|--------------------------|--------------|------------------------------|---------------|---------------------------|---------------|-------------------------|--------------|
| Irrigation levels | safety materials | 2011 | 2012 | 2011 | 2012 | 2011 | 2012 | 2011 | 2012 | 2011 | 2012 |
| 60 % | Water | 30.50 | 30.67 | 11.67 | 12.00 | 280.30 | 288.20 | 52.60 | 60.00 | 11.50 | 11.60 |
| | Amino-Z | 34.67 | 36.00 | 18.00 | 19.00 | 887.80 | 937.10 | 82.20 | 93.80 | 12.30 | 13.23 |
| | Lithovit | 38.67 | 39.83 | 19.30 | 22.00 | 661.00 | 753.40 | 110.64 | 107.30 | 16.10 | 14.50 |
| | Mycorrhizal | 36.17 | 36.33 | 22.00 | 21.50 | 666.50 | 651.40 | 117.95 | 110.80 | 17.40 | 19.30 |
| | Sap | 38.00 | 38.33 | 22.17 | 22.00 | 778.20 | 772.20 | 122.10 | 124.60 | 18.20 | 19.10 |
| Means of irrigation levels | | 35.60 | 36.23 | 18.63 | 19.30 | 654.73 | 680.45 | 97.10 | 99.30 | 15.10 | 15.55 |
| 80 % | Water | 30.67 | 31.50 | 15.00 | 15.33 | 437.60 | 447.20 | 80.91 | 82.00 | 11.10 | 11.00 |
| | Amino-Z | 32.67 | 36.00 | 17.00 | 17.50 | 728.70 | 750.20 | 92.16 | 94.40 | 13.90 | 15.90 |
| | Lithovit | 36.00 | 36.50 | 23.50 | 24.00 | 712.00 | 975.10 | 102.70 | 135.80 | 13.93 | 13.70 |
| | Mycorrhizal | 37.43 | 37.77 | 19.00 | 19.00 | 651.80 | 651.80 | 97.70 | 100.20 | 15.40 | 14.70 |
| | Sap | 39.00 | 41.67 | 17.50 | 18.00 | 632.00 | 650.10 | 103.97 | 115.25 | 17.30 | 15.80 |
| Means of irrigation levels | | 35.15 | 36.69 | 18.40 | 18.77 | 632.44 | 694.87 | 95.49 | 105.53 | 14.33 | 14.22 |
| 100% | Water | 30.33 | 34.00 | 16.33 | 16.00 | 541.00 | 530.10 | 79.80 | 79.00 | 10.80 | 10.80 |
| | Amino-Z | 35.83 | 36.00 | 23.00 | 22.75 | 862.90 | 853.50 | 86.37 | 100.00 | 18.40 | 18.70 |
| | Lithovit | 36.00 | 37.00 | 19.00 | 18.50 | 695.10 | 676.90 | 79.70 | 102.50 | 15.60 | 14.30 |
| | Mycorrhizal | 39.00 | 39.00 | 18.00 | 18.00 | 528.20 | 538.20 | 101.00 | 97.00 | 16.30 | 15.50 |
| | Sap | 40.00 | 40.00 | 23.00 | 23.00 | 1034.80 | 1034.00 | 115.70 | 116.40 | 17.40 | 17.00 |
| Means of irrigation levels | | 36.23 | 37.20 | 19.87 | 19.65 | 732.40 | 726.53 | 92.51 | 98.98 | 15.70 | 15.26 |
| 120 % | Water | 30.67 | 31.00 | 15.67 | 16.67 | 627.20 | 600.40 | 81.77 | 78.82 | 14.10 | 14.00 |
| | Amino-Z | 34.67 | 37.00 | 17.00 | 17.00 | 865.40 | 970.20 | 88.60 | 88.10 | 19.40 | 15.40 |
| | Lithovit | 37.00 | 39.00 | 18.83 | 19.00 | 744.20 | 825.20 | 86.53 | 86.53 | 19.80 | 17.70 |
| | Mycorrhizal | 37.00 | 37.50 | 24.00 | 24.50 | 863.50 | 951.60 | 182.77 | 170.50 | 22.60 | 21.60 |
| | Sap | 41.00 | 42.00 | 19.00 | 18.33 | 1477.40 | 1251.50 | 122.30 | 134.40 | 17.30 | 15.90 |
| Means of irrigation levels | | 36.07 | 37.30 | 18.90 | 19.10 | 915.54 | 919.78 | 112.39 | 111.67 | 18.64 | 16.92 |
| Means of safety materials | Water | 30.54 | 31.79 | 14.67 | 15.00 | 471.52 | 466.47 | 73.77 | 74.96 | 11.88 | 11.85 |
| | Amino-Z | 34.46 | 36.25 | 18.75 | 19.06 | 836.18 | 877.74 | 87.33 | 94.02 | 16.00 | 15.81 |
| | Lithovit | 36.92 | 38.09 | 20.16 | 20.88 | 703.08 | 807.64 | 94.89 | 108.03 | 16.36 | 15.05 |
| | Mycorrhizal | 37.40 | 37.65 | 20.75 | 20.75 | 677.50 | 698.23 | 124.85 | 119.62 | 17.93 | 17.78 |
| | Sap | 39.50 | 40.50 | 20.42 | 20.33 | 980.60 | 926.95 | 116.02 | 122.66 | 17.55 | 16.95 |
| L .S. D at 5 % level | irrigation levels | N.S | N.S | 0.61 | N.S | 32.62 | 73.94 | 9.04 | 8.32 | 0.77 | 0.76 |
| | safety materials | 1.14 | 0.95 | 0.50 | 0.62 | 78.89 | 55.48 | 9.95 | 6.77 | 0.74 | 0.58 |
| | Interaction | 0.79 | 0.66 | 0.35 | 0.43 | 54.77 | 38.52 | 6.90 | 4.70 | 0.51 | 0.40 |

Table 5. Effect of irrigation levels and safety materials on yield and yield components of snap bean during 2011 and 2012 seasons

| Treatments | | Pod length cm | | Pod diameter cm | | Fresh pod weight g | | Pod yield t/fed | |
|-----------------------------------|-------------------|------------------|--------------|--------------------|-------------|-----------------------|-------------|--------------------|-------------|
| Irrigation levels | safety materials | 2011 | 2012 | 2011 | 2012 | 2011 | 2012 | 2011 | 2012 |
| 60 % | Water | 12.32 | 12.04 | 0.84 | 0.84 | 4.88 | 4.57 | 2.86 | 2.88 |
| | Amino-Z | 13.23 | 13.60 | 0.88 | 0.84 | 5.50 | 5.84 | 3.16 | 4.64 |
| | Lithovit | 13.23 | 13.43 | 0.87 | 0.84 | 5.40 | 5.91 | 3.11 | 3.19 |
| | Mycorrhizal | 12.94 | 13.29 | 0.84 | 0.84 | 5.82 | 6.26 | 3.78 | 4.05 |
| | Sap | 13.18 | 13.31 | 0.85 | 0.84 | 5.98 | 6.39 | 5.28 | 4.45 |
| Means of irrigation levels | | 12.98 | 13.14 | 0.86 | 0.84 | 5.51 | 5.79 | 3.64 | 3.84 |
| 80 % | Water | 12.20 | 12.20 | 0.81 | 0.81 | 4.65 | 4.77 | 2.89 | 2.70 |
| | Amino-Z | 12.43 | 12.79 | 0.83 | 0.81 | 5.58 | 5.53 | 4.79 | 4.85 |
| | Lithovit | 14.37 | 14.32 | 0.85 | 0.87 | 6.29 | 6.21 | 3.69 | 4.49 |
| | Mycorrhizal | 12.50 | 12.91 | 0.85 | 0.83 | 5.69 | 5.58 | 3.45 | 4.06 |
| | Sap | 12.70 | 12.60 | 0.83 | 0.81 | 5.32 | 5.34 | 3.64 | 4.42 |
| Means of irrigation levels | | 12.94 | 12.96 | 0.83 | 0.83 | 5.51 | 5.49 | 3.70 | 4.10 |
| 100% | Water | 11.90 | 12.42 | 0.80 | 0.82 | 4.63 | 4.59 | 2.30 | 2.36 |
| | Amino-Z | 12.25 | 12.88 | 0.81 | 0.82 | 4.76 | 4.81 | 4.34 | 4.91 |
| | Lithovit | 12.59 | 12.41 | 0.84 | 0.84 | 5.13 | 6.01 | 2.92 | 2.93 |
| | Mycorrhizal | 12.65 | 12.95 | 0.87 | 0.86 | 5.29 | 5.99 | 2.39 | 2.76 |
| | Sap | 12.66 | 12.85 | 0.84 | 0.85 | 4.84 | 5.76 | 4.98 | 4.93 |
| Means of irrigation levels | | 12.41 | 12.70 | 0.83 | 0.84 | 4.93 | 5.43 | 3.38 | 3.58 |
| 120 % | Water | 12.56 | 12.30 | 0.80 | 0.82 | 4.03 | 4.61 | 3.06 | 2.56 |
| | Amino-Z | 13.41 | 12.87 | 0.83 | 0.84 | 4.90 | 5.73 | 6.15 | 5.19 |
| | Lithovit | 12.71 | 12.89 | 0.84 | 0.86 | 5.85 | 6.24 | 3.64 | 4.52 |
| | Mycorrhizal | 14.03 | 14.06 | 0.86 | 0.87 | 6.59 | 6.67 | 4.48 | 4.83 |
| | Sap | 12.65 | 12.71 | 0.81 | 0.82 | 5.34 | 5.22 | 6.18 | 5.49 |
| Means of irrigation levels | | 13.07 | 12.97 | 0.82 | 0.84 | 5.35 | 5.69 | 4.70 | 4.52 |
| Means of safety materials | Water | 12.25 | 12.61 | 0.81 | 0.82 | 4.55 | 4.64 | 2.78 | 2.62 |
| | Amino-Z | 12.82 | 13.03 | 0.83 | 0.83 | 5.19 | 5.48 | 4.61 | 4.90 |
| | Lithovit | 13.22 | 13.26 | 0.85 | 0.85 | 5.67 | 6.09 | 3.34 | 3.78 |
| | Mycorrhizal | 13.03 | 13.30 | 0.85 | 0.85 | 5.84 | 6.13 | 3.53 | 3.92 |
| | Sap | 12.79 | 12.87 | 0.83 | 0.83 | 5.37 | 5.68 | 5.02 | 4.82 |
| L .S. D at 5 % level | irrigation levels | N.S | N.S | N.S | N.S | 0.34 | N.S | 0.46 | 0.46 |
| | safety materials | 0.60 | 0.44 | 0.03 | N.S | 0.67 | 0.81 | 0.53 | 0.52 |
| | Interaction | N.S | 0.31 | N.S | N.S | 0.29 | N.S | 0.37 | N.S |

Table 6. Effect of irrigation levels and safety materials on chemicals properties of snap bean seeds and leaf chlorophyll during 2011 and 2012 seasons

| Treatments | | leaf chlorophyll SPAD | | Total sugars % | | Protein % | | N% | | P% | | K% | |
|----------------------------|-------------------|--------------------------|--------------|-------------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Irrigation levels | safety materials | 2011 | 2012 | 2011 | 2012 | 2011 | 2012 | 2011 | 2012 | 2011 | 2012 | 2011 | 2012 |
| 60 % | Water | 47.60 | 46.73 | 10.31 | 9.65 | 12.25 | 10.81 | 1.96 | 1.73 | 0.35 | 0.39 | 2.19 | 2.18 |
| | Amino-Z | 43.90 | 46.87 | 14.40 | 14.56 | 14.88 | 15.00 | 2.38 | 2.40 | 0.45 | 0.50 | 2.36 | 2.33 |
| | Lithovit | 44.70 | 47.63 | 12.26 | 12.07 | 13.13 | 12.88 | 2.10 | 2.06 | 0.46 | 0.52 | 2.21 | 2.15 |
| | Mycorrhizal | 46.25 | 47.07 | 15.23 | 13.94 | 13.13 | 13.50 | 2.10 | 2.16 | 0.44 | 0.50 | 2.23 | 2.27 |
| | Sap | 50.45 | 49.30 | 13.53 | 14.24 | 13.13 | 13.50 | 2.10 | 2.16 | 0.39 | 0.38 | 2.14 | 2.12 |
| Means of irrigation levels | | 46.58 | 47.52 | 13.15 | 12.89 | 13.30 | 13.14 | 2.13 | 2.11 | 0.41 | 0.46 | 2.23 | 2.21 |
| 80 % | Water | 47.00 | 47.77 | 10.34 | 9.76 | 12.50 | 12.50 | 2.00 | 2.00 | 0.36 | 0.30 | 2.27 | 2.20 |
| | Amino-Z | 52.60 | 51.23 | 14.95 | 14.40 | 13.13 | 12.68 | 2.10 | 2.03 | 0.34 | 0.36 | 2.14 | 2.09 |
| | Lithovit | 45.20 | 48.05 | 12.22 | 12.22 | 12.25 | 12.37 | 1.96 | 1.98 | 0.36 | 0.39 | 2.01 | 2.01 |
| | Mycorrhizal | 51.70 | 49.75 | 13.62 | 14.91 | 13.13 | 12.87 | 2.10 | 2.06 | 0.42 | 0.40 | 2.24 | 2.27 |
| | Sap | 50.30 | 48.60 | 12.13 | 11.96 | 12.25 | 12.50 | 1.96 | 2.00 | 0.43 | 0.40 | 2.12 | 2.16 |
| Means of irrigation levels | | 49.36 | 49.08 | 12.65 | 12.65 | 12.65 | 12.58 | 2.02 | 2.01 | 0.38 | 0.37 | 2.15 | 2.14 |
| 100% | Water | 45.45 | 44.97 | 10.13 | 11.52 | 13.13 | 13.50 | 2.10 | 2.16 | 0.39 | 0.38 | 1.99 | 1.97 |
| | Amino-Z | 47.87 | 49.55 | 13.29 | 13.84 | 14.88 | 17.00 | 2.38 | 2.72 | 0.35 | 0.36 | 2.15 | 2.16 |
| | Lithovit | 51.20 | 44.30 | 13.05 | 13.36 | 14.00 | 14.06 | 2.24 | 2.25 | 0.34 | 0.32 | 1.98 | 2.01 |
| | Mycorrhizal | 49.75 | 49.33 | 12.09 | 11.82 | 15.75 | 15.62 | 2.52 | 2.50 | 0.37 | 0.39 | 2.07 | 2.09 |
| | Sap | 44.80 | 44.53 | 12.62 | 12.18 | 14.88 | 15.00 | 2.38 | 2.40 | 0.42 | 0.41 | 1.91 | 1.94 |
| Means of irrigation levels | | 47.81 | 46.54 | 12.24 | 12.55 | 14.52 | 15.04 | 2.32 | 2.41 | 0.37 | 0.37 | 2.02 | 2.03 |
| 120 % | Water | 37.50 | 35.75 | 9.45 | 9.72 | 14.88 | 14.94 | 2.38 | 2.39 | 0.39 | 0.40 | 2.17 | 2.19 |
| | Amino-Z | 50.50 | 42.25 | 9.99 | 9.22 | 14.88 | 14.87 | 2.38 | 2.38 | 0.48 | 0.51 | 2.10 | 2.16 |
| | Lithovit | 47.10 | 43.67 | 10.18 | 9.92 | 12.25 | 12.50 | 1.96 | 2.00 | 0.41 | 0.44 | 2.28 | 2.26 |
| | Mycorrhizal | 39.77 | 42.15 | 11.87 | 11.92 | 13.13 | 13.75 | 2.10 | 2.20 | 0.53 | 0.52 | 1.91 | 1.92 |
| | Sap | 44.17 | 43.25 | 10.16 | 10.53 | 14.00 | 14.00 | 2.24 | 2.24 | 0.56 | 0.57 | 2.21 | 2.26 |
| Means of irrigation levels | | 43.81 | 41.41 | 10.33 | 10.26 | 13.82 | 14.00 | 2.21 | 2.24 | 0.47 | 0.49 | 2.13 | 2.16 |
| Means of safety materials | Water | 44.39 | 43.80 | 10.06 | 10.16 | 13.19 | 13.00 | 2.11 | 2.08 | 0.37 | 0.37 | 2.16 | 2.14 |
| | Amino-Z | 48.72 | 47.48 | 13.16 | 13.01 | 14.44 | 14.88 | 2.31 | 2.38 | 0.40 | 0.44 | 2.19 | 2.18 |
| | Lithovit | 47.05 | 45.91 | 11.93 | 11.89 | 12.90 | 12.94 | 2.06 | 2.07 | 0.39 | 0.42 | 2.12 | 2.11 |
| | Mycorrhizal | 46.87 | 47.08 | 13.20 | 13.15 | 13.78 | 13.94 | 2.20 | 2.23 | 0.44 | 0.45 | 2.11 | 2.14 |
| | Sap | 47.43 | 46.42 | 12.11 | 12.23 | 13.56 | 13.75 | 2.17 | 2.20 | 0.45 | 0.44 | 2.09 | 2.11 |
| L.S.D at 5 % level | irrigation levels | 1.84 | 2.01 | 0.40 | 0.65 | 0.35 | 0.34 | N.S | N.S | 0.05 | 0.04 | 0.04 | 0.07 |
| | safety materials | 1.81 | N.S | 0.37 | 0.70 | 0.32 | 0.22 | N.S | N.S | 0.04 | 0.03 | N.S | 0.06 |
| | Interaction | 1.25 | N.S | 0.26 | 0.48 | 0.22 | N.S | N.S | N.S | 0.03 | 0.02 | 0.02 | 0.04 |