**Table 4.** Range of tile drainage annual P loads reported in the literature.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Location** | **Time Base** | **Land Use** | **Soil texture** | **TP**  **kg/ha/yr** | **TSP**  **kg/ha/yr** | **SRP**  **kg/ha/yr** | **PP**  **kg/ha/yr** | **Reference** |
| NY | Annual |  | Muck |  |  | 0.6 – 30.7 |  | Duxbury and Peverly 1978 |
| NY | Annual | Corn | Loam, silt loam |  |  | 0.027 – 1.062 |  | Hergert et al. 1981 |
| NY | Multi-event | Corn silage | Silty clay | 0.13 |  | 0.05 |  | Klaiber 2015 |
| Quebec | Annual | Soybeans | Clay loam | 2.3 |  |  |  | Eastman et al. 2010 |
| Quebec | Annual | Alfalfa | Sandy loam | 0.3 – 0.4 |  |  |  | Eastman et al. 2010 |
| Quebec | Annual |  | Sandy clay loam | 0.10 – 1.23 |  |  |  | Enright and Madramootoo 2004 |
| Quebec | Seasonal |  | Sandy clay loam | 0.0098 |  | 0.034\* |  | Jamieson et al. 2003 |
| Quebec | Annual | Corn, barley, soybeans | Clay loam | 0.69 – 1.23 |  |  |  | Simard 2005 |
| Quebec | Annual | Corn | Sandy loam | 0.23 – 0.27 |  |  |  | Simard 2005 |
| Quebec | Annual | Corn, grains, grass | Silty loam | 0.36 – 1.13 | 0.04 – 0.10 |  | 0.32 – 1.03 | Goulet et al. 2006 |
| Ontario | Annual | Corn |  |  |  | 0.005 – 0.041 | 0.05 – 0.13 | Ball Coelho et al. 2012 |
| Ontario | Annual | Corn, oats, alfalfa | Clay | 0.13 – 0.24 | 0.01 – 0.29 |  |  | Bolton et al. 1970 |
| Ontario | Annual | Corn | Clay loam | 0.39 – 1.23 | 0.10 – 1.02 |  |  | Culley et al. 1983a |
| Ontario | Annual | Bluegrass | Clay loam | 0.24 – 3.50 | 0.15 – 3.29 |  |  | Culley et al. 1983a |
| Ontario | Annual | Oats | Clay loam | 0.28 – 1.40 | 0.09 – 1.10 |  |  | Culley et al. 1983a |
| Ontario | Annual | Alfalfa | Clay loam | 0.28 – 1.44 | 0.10 – 1.08 |  |  | Culley et al. 1983a |
| Ontario | Annual | Corn | Clay loam |  |  | 0.286 – 1.338 |  | Gaynor and Findlay 1995 |
| Ontario | Annual | Soybeans | Sandy loam | 0.09 – 0.84 |  | 0.018 – 0.19 |  | Lam et al. 2016 |
| Ontario | Annual | Wheat | Sandy loam | 0.024 – 0.072 |  | 0.005 – 0.024 |  | Lam et al. 2016 |
| Ontario | Multi-event | Corn-soybeans | various | 0.28 |  | 0.08 |  | Miller 1979 |
| Ontario | Annual | Corn-soybeans | Clay | 0.21 – 2.13 |  | 0.012 – 0.12 | 0.19 – 1.82 | Tan and Zhang 2011 |
| Ontario | Annual | Wheat, corn, soybeans | Silt loam, clay loam | 0.17 – 0.26 |  | 0.017 – 0.023 |  | Van Esbroeck 2015 |
| Ontario | Annual | Various | Clay loam | 0.25 – 1.88 |  | 0.02 – 0.58 |  | Zhang et al. 2015b |
| MI | Annual | Corn-soybeans | Loam | 0.15 – 0.18 | 0.04 – 0.08 |  |  | Gold and Loudon 1989 |
| WI | Annual | Corn silage | Fine loamy | 0.24 – 1.53 |  | 0.16 – 0.86 |  | Madison et al. 2014 |
| WI | Annual | Corn-soybeans | Fine loamy | 0.49 – 2.73 |  | 0.36 – 2.10 |  | Madison et al. 2014 |
| WI | Annual | Pasture | Fine loamy | 0.27 – 2.63 |  | 0.13 – 2.08 |  | Madison et al. 2014 |
| WI | Annual | Continuous corn |  | 1.01 |  |  |  | Ruark et al. 2012 |
| WI | Annual | Corn-soybean |  | 1.46 |  |  |  | Ruark et al. 2012 |
| WI | Annual | Pasture |  | 1.57 |  |  |  | Ruark et al. 2012 |
| MN | Annual | Corn-soybeans | Clay loam | 0.1 – 0.2 |  | 0.04-0.09\* |  | Logan et al. 1980 |
| MN | Seasonal | Various | Various |  | 0.01 – 0.19 | <0.01 – 0.15 |  | Oquist et al. 2007 |

\* ortho-P reported

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Location** | **Time Base** | **Land Use** | **Soil texture** | **TP**  **kg/ha/yr** | **TSP**  **kg/ha/yr** | **SRP**  **kg/ha/yr** | **PP**  **kg/ha/yr** | **Reference** |
| IL | Annual | Corn-soybean | Silty clay loam |  |  | 0.11 – 0.23 |  | Algoazany et al. 2007 |
| IL | Annual | Row crop | Loess | 0.13 – 1.31 |  | 0.05 – 0.35 |  | Gentry et al. 2007 |
| IL | Annual | Corn-soybean |  |  |  | 0.18 – 0.79 |  | Xue et al. 1998 |
| IN | Annual |  |  |  |  | 0.03 |  | Smith et al. 2015a |
| IN | Multi-event | Soybeans | Loam, silt loam | 0.001 – 0.086 |  | <0.001 – 0.018 |  | Vidon and Cuadra 2011 |
| IN | Annual | Corn, soybeans | Silty clay loam |  |  | 0.02 – 0.23 |  | Hernandez-Ramirez et al. 2011 |
| IN | Annual | Corn | Silt loam |  | 0.02 – 0.08 |  |  | Kladivko et al. 1991 |
| IN/MN | Annual | Corn, wheat, soybeans | Silty clay | 0.03 – 0.43 |  | 0.002 – 0.073 | 0.02 – 0.32 | Bottcher et al. 1981 |
| OH | Annual | Corn, soybeans | Silt loam, clay loam | 0.28 – 0.92 |  | 0.22 – 0.84 |  | King et al. 2014 |
| OH | Seasonal | Corn, soybeans | Silt loam, clay loam | 0.52 – 1.20 |  | 0.26 – 0.99 |  | King et al. 2016 |
| OH | Multi-event | Corn | Silt loam | 0.11 – 0.34 |  |  |  | Logan and Schwab 1976 |
| OH | Annual | Corn-oats | Silty clay | 0.74 – 0.80 |  | 0.07 – 1.37\* |  | Logan et al. 1980 |
| OH | Annual | Soybeans | Clay, loam | 0.04 – 0.82 |  | 0.01 – 0.26\* |  | Logan et al. 1980 |
| OH | Annual | Corn-soybeans-oats | Silty clay | 0.30 – 2.40 |  |  |  | Schwab et al. 1980 |
| OH | Annual | Alfalfa-grass | Silty clay | 0.80 – 1.50 |  |  |  | Schwab et al. 1980 |
| OH | Multi-event | Corn-wheat | Silt loam | 0.001 – 0.384 | 0.001 – 0.210 |  |  | Williams et al. 2016 |
| Multiple | Annual | Multiple | Multiple | 0.36 – 1.18 |  | 0.04 – 0.12 | 0.33 – 0.88 | Christianson et al. 2016 |
| IA | Annual | Corn | Silt loam | 0 – 0.04 |  | 0 – 0.009 |  | Baker et al. 1975 |
| IA | Annual | Corn | Loam | 0.001 – 0.14\*\* |  |  |  | Daigh et al. 2015 |
| IA | Annual | Prairie | Loam | 0.04 – 0.07\*\* |  |  |  | Daigh et al. 2015 |
| IA | Annual | Corn, soybeans | Silty clay loam |  |  | 0.002 – 0.009 |  | Nayak et al. 2009 |
| LA | Annual | Corn-soybean | Clay loam | 0.50 |  |  |  | Bengston et al. 1995 |
| TX | Annual | Turf grass | Loamy sand |  |  | 0.08 – 0.38 |  | King et al. 2006 |
| Manitoba | Annual | Corn | Sandy loam |  |  | 0.3 – 0.6\* |  | Cordeiro et al. 2014 |
| \* ortho-P reported \*\* Total Reactive P reported (undefined) | | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Location** | **Time Base** | **Land Use** | **Soil texture** | **TP**  **kg/ha/yr** | **TSP**  **kg/ha/yr** | **SRP**  **kg/ha/yr** | **PP**  **kg/ha/yr** | **Reference** |
| England | Annual | Winter wheat, oats | Clay | 0.02 – 0.59 |  | 0.005 – 0.06 |  | Addiscott et al. 2000 |
| England | Seasonal | Winter cereals | Clay | 0.37 – 0.91 |  | 0.05 – 0.24 |  | Catt et al. 1998 |
| England | Annual | Mixed cropland | Loam |  |  |  | 1.57 | Chapman et al. 2001 |
| England | Annual | Permanent grassland | Clay loam |  |  | 0.20 |  | Hawkins and Scholefield 1996 |
| England | Annual | Row crops | Clay | 0.08 – 1.16 | 0.01 – 0.48 | 0.02 – 0.44 |  | Hodgkinson et al. 2002 |
| Netherlands | Annual | Grass | Sandy | 0.31 |  |  |  | Rozenmeijer et al. 2010 |
| Netherlands | Annual | Grass | Sandy | 0.14 – 0.15 |  |  |  | Rozenmeijer et al. 2016 |
| Spain | Seasonal | Cotton, sugar beets | Clay | 0.02 – 0.28 |  | 0.01 – 0.16 |  | Delgado et al. 2006 |
| Albania | Annual | Corn | Silty clay |  |  | 0.22 – 0.36\* |  | Grazhdani et al. 1996 |
| Lithuania | Annual | Small grains, potatoes | Sandy loam | 0.055 – 0.298 |  |  |  | Buciene et al. 2007 |
| Denmark | Annual | Wheat | Sandy loam | 0.07 – 0.33 | 0.03 – 0.44 |  | 0.04 – 0.18 | Grant et al. 199 |
| Denmark | Annual | Various | Various | 0.14 – 1.3 |  |  |  | Kronvang et al. 2005 |
| Finland | Seasonal | Plowed fallow | Silty clay | 0.14 |  | 0.03 |  | Turtola and Paajanen 1995 |
| Sweden | Annual | Small grains, beans |  | 0.56 – 4.63 |  | 0.35 – 0.76 |  | Stenberg et al. 2012 |
| Sweden | Annual | Small grains | Clay | 0.06 – 1.13 |  | 0.11 – 0.20 | 0.46 – 0.94 | Svanback et al. 2014 |
| Sweden | Multi-event | Small grains | Clay | 0.02 – 0.09 |  | 0.003 – 0.042 |  | Ullen 1995 |
| Sweden | Multi-event | Fallow | Clay | 0.03 – 0.06 |  | 0.02 – 0.03 |  | Ullen 1995 |
| Sweden | Seasonal | Wheat, barley | Silty clay | 0.05 – 0.46 |  | 0.02 – 0.09 |  | Ulen and Persson 1999 |
| Sweden | Annual | Wheat, oats | Loam |  |  | 0.04 – 0.54 |  | Ulen et al. 2014 |
| Sweden | Annual | Small grains, beans | Clay | 2.26 |  | 0.60 |  | Ulen et al. 2016 |
| Sweden | Annual | Potato | Loamy sand | 0.05 – 0.14 |  |  |  | Wesstrom and Messing 2007 |
| Sweden | Annual | Barley | Sandy loam | 0.07 – 0.12 |  | 0.02 – 0.10 |  | Wesstrom et al. 2014 |
| NZ | Seasonal | Pasture | Silt loam | 0.01 – 0.18 |  | 0.06 – 0.07 | 0.002 – 0.09 | Sharpley and Syers 1979 |
| NZ | Annual | Pasture | Clay loam/silt loam | 0.12 – 1.93 |  |  |  | Tanner and Sukias 2011 |
| NZ | Annual | Pasture | Silt loam | 0.06 – 0.59 | 0.01 – 0.35 | 0.002 – 0.14 | 0.05 – 0.24 | McDowell et al. 2005 |
| NZ | Seasonal | Pasture | Silt loam | 1.92 |  | 0.45 | 0.92 | McDowell and Sharpley 2008 |
| NZ | Annual | Pasture | Silt loam | 0.152 | 0.059 | 0.048 |  | Monaghan et al. 2002 |
| \* ortho-P reported | | | | | | | | |