TABLE A1. *Estimates of annual (or seasonal) respiration as a fraction of annual (or seasonal) photosynthesis in intact ecosystems*

Ecosystem	Respiration/Photosynthesis	Reference
Crop		
Alfalfa	0·35–0·49	Thomas and Hill (1949)
Maize, rice, and wheat	*c*. 0·3–0·6	Amthor (1989, Table 6.1)
Grassland		
Shortgrass prairie	0·34	Andrews *et al*. (1974)
	0·51	Detling (1979)
Tallgrass prairie	0·61–0·65	Risser *et al*. (1981), range for three treatments
Forest		
Tropical moist		
Ivory Coast	0·75	Müller and Nielsen (1965)
Puerto Rico	0·88	Derived from Table 24 in Odum (1970)
Southern Thailand	0·66	Kira (1975)
Temperate		
Warm evergreen	0·72	Kira (1975)
Warm evergreen 'oak'	0·66	Kira and Yabuki (1978)
Abies sachalinensis	0·53	Kira (1975)
Castanopis cuspidata	0·575	Kira (1975)
Chamaecyparis obtusa plantation	0·62	Hagihara and Hozumi (1991)
Cryptomeria japonica plantation	0·71	Kira (1975), mean of five estimates
Fagus crenata	0·44,0·56	Kira (1975), secondary forest and plantation
F. sylvatica	0·39–0·47	Möller *et al*. (1954), range for four ages
Fraxinus excelsior plantation	0·37	Kira (1975)
Liriodendron tulipifera	0·66	Harris *et al*. (1975)
Picea abies plantation	0·32	Kira (1975)
Pinus densiflora plantation	0·71	Kira (1975)
P. ponderosa	0·55	Law *et al*. (1999)
P. taeda plantation	0·58	Kinerson (1975)
P. spp.	0·39–0·71*	Ryan *et al*. (1994)
Quercus-Acer (southern)	0·44–0·55	P. J. Hanson (pers. comm. 2000), 7 years
Quercus-Acer (northern)	0·54	M. L. Goulden (pers. comm. 1997)
Q.-Pinus	0·55	Whittaker and Woodwell (1969)
Q. spp.	0·61	Satchell (1973) (in Edwards *et al*., 1981)
Q.-Carpinus	0·38	Medwecka-Kornas *et al*. (1974) (in Edwards *et al*., 1981)
Subalpine		
Coniferous	0·72	Kitazawa (1977) (in Edwards *et al*., 1981)
Abies	0·675	Kira (1975)
A. veitchii	0·61	Kira (1975), mean of three estimates
Boreal		
Picea mariana	0·72–0·77	Ryan *et al*. (1997)
Pinus banksiana	0·69–0·74	Ryan *et al*. (1997)
Populus tremuloides	0·64–0·67	Ryan *et al*. (1997)
Coastal salt marsh, temperate		
Spartina	0·77	Teal (1962)
Spartina-Distichlis	0·69	Woodwell *et al*. (1979)
Tundra, arctic	0·50	Reichle (1975)

Both respiration and photosynthesis have the same units (e.g. mol C m^{-2} ground $year^{-1}$) and photosynthesis is the balance of photosynthetic carboxylations with photorespiratory decarboxylations. To my knowledge, these estimates of respiration and photosynthesis assume that leaf respiration occurs at about the same rate in the light as in the dark, even though photosynthesis probably slows leaf respiration.

* Range of values for seven young (16–40-year-old) *Pinus* stands. Ryan *et al*. (1994) gave daily (24 h) stem, branch, and root respiration, but only night-time foliage respiration. To obtain total respiration here, night-time foliage respiration was doubled. To then obtain photosynthesis, night-time foliage respiration was added to daytime canopy net CO_2 assimilation. Both transformations assumed that daytime foliage respiration was similar to night-time foliage respiration in spite of differences in temperature and possible effects of photosynthesis on foliage respiration.