Geography, Math and Economics

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The tables below are from a USDA report concerning the loss of topsoil and its impact on the production significant crops. Examine the data and try to answer the questions at the bottom.

Table 4.2—Mean loss in annual yield per ton of soil erosion

Region	Crop	Mean yield	Mean yield loss per ton of soil erosion	
		Tons per hectare	*Kg per hectare*	*% of mean yield*
Africa	Maize	2.6	0.9	0.03
Asia	Maize	1.7	0.7	0.04
	Millet	0.3	0.1	0.03
	Soybeans	0.9	-0.5	-0.01
	Wheat	3.0	0.7	0.02
Australia	Potatoes	54.1	3.6	0.01
	Wheat	1.2	0.5	0.04
Europe	Millet	0.3	0.1	0.02
	Potatoes	11.4	0.6	0.00
	Soybeans	0.6	0.1	0.02
	Wheat	3.5	0.2	0.00
Latin America	Maize	2.9	1.4	0.05
	Potatoes	20.2	0.7	0.00
	Soybeans	2.1	0.6	0.03
	Wheat	2.1	0.4	0.02
North America	Maize	6.2	0.6	0.01
	Potatoes	30.5	127.0	0.42
	Sorghum	4.2	0.1	0.00
	Soybeans	2.1	0.3	0.01
	Wheat	2.6	0.4	0.01

Notes:

1. Mean yield indicates the number of tons of each crop is produced on one hectare of land

2. The first column under "mean yield loss per ton of soil erosion" indicates the number of kilograms of each crop is lost when one ton of soil erodes. The second column gives that loss in terms of a percent of the total amount of that crop
3. Millet and sorghum are both grains similar to wheat

Table 4.4—Estimated value of potential annual erosion-induced production losses by crop and continent

Region	Crop	Total production	Production loss	Value of total production	Value of production loss	Production loss
		Thousand tons per year		*Million $ per year*		*% per year*
Africa	Maize	41,198	202	3,000	15	0.49
	Subtotal	--	--	3,000	15	0.49
Asia	Maize	162,289	961	11,820	70	0.59
	Millet	12,693	64	923	5	0.51
	Soybeans	23,493	-254	4,230	-46	1.08
	Wheat	254,338	740	23,898	69	0.29
	Subtotal	--	--	40,870	98	0.24
Australia	Potatoes	1,872	2	241	<1	0.12
	Wheat	22,739	152	2,137	14	0.67
	Subtotal	--	--	2,378	15	0.61
Europe	Millet	1,060	2	77	<1	0.23
	Potatoes	136,832	51	17,651	7	0.04
	Soybeans	2,3134	5	417	1	0.22
	Wheat	181,517	74	17,055	7	0.04
	Subtotal	--	--	35,200	15	0.04
Latin America	Maize	74,608	704	5,434	51	0.94
	Potatoes	16,281	2	2,100	<1	0.01
	Soybeans	55,426	184	9,979	33	0.33
	Wheat	21,720	58	2,041	5	0.27
	Subtotal	--	--	19,554	90	0.46
North America	Maize	259,122	399	18,872	29	0.15
	Potatoes	25,903	1,031	3,341	133	3.98
	Sorghum	13,811	8	897	1	0.06
	Soybeans	77,879	191	14,021	34	0.24
	Wheat	90,360	96	8,490	9	0.11
	Subtotal	--	--	45,622	206	0.45
Total	Maize	537,217	2,266	39,126	165	0.42
	Potatoes	180,888	1,086	23,335	140	0.60
	Millet	13,752	67	1,000	5	0.48
	Sorghum	13,811	8	897	1	0.06
	Soybeans	159,110	126	28,646	23	0.08
	Wheat	570,675	1,120	53,621	105	0.20
	Total	--	--	146,625	439	0.30

Questions

1. Locate anywhere in the two tables you see a negative number. What does the negative signify in each instance? What crop produces negative numbers? Notice how it is only negative on one continent and positive when it is grown in others. Can you think of why this might be?
2. Look at table 4.2. Farming which crop results in the greatest loss of topsoil in North America? According to table 4.4, this results in the loss of how much money each year?
3. In table 4.4, look at the total production loss from farming the 6 crops listed (bottom right cell). Given just this information, how many years would it take for the production loss percent to reach 100%? What happens then?
4. Look at the totals under the "Total production" and "Production loss" columns in table 4.4. Find the percent of the total production each crop loses per year. Rank these from highest to lowest.
5. From looking at these two tables, what can we conclude about the importance of topsoil to the farming economy of the world?