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Case Study 7.3-1 Selecting phosphorus practices for wheat based on grower circumstances. The outcome of a workshop on soil test interpretation that was part of the International Symposium on Soil Testing and Plant Analysis in Olympia, Washington, illustrates the importance of grower circumstances on P management practice selection (Fixen, 1994). Workshop participants were soil-testing professionals from 11 countries and were divided into two classes of 20 each. Each class was divided into four groups of five participants with each group having information on a specific farmer. The four farmers, all with wheat as their primary cash crop, were described as follows:

- Young renter. This young farmer carries a high debt load, is very short on capital, and cannot negotiate more than a two-year lease. The farmer grows lower yields than most others in the area due partly to capital constraints.
- Well established farmer. This individual has no debt, invests surplus capital in mutual funds and has excellent yields for the area. Land in question was recently purchased.
- Expanding farmer. This farmer recently made a large land purchase and is short on capital.
- Part-time farmer. This farmer has adequate capital, but also has a nine month teaching job and faces serious time conflicts during planting. This person doesn't feel there is time to band fertilizer with the drill and prefers that the fertilizer dealer take care of fertilizer spreading.

All groups were given the same calibration data, uptake data, and soil test level and asked to develop short term and long term P management plans for their farmer (one of the four described above). After each group had completed their plans, they were discussed and compared to the plans printed by a spreadsheet program called PKMAN developed by the Institute to facilitate personalization of soil test interpretation. The program estimates the soil test level at which the last dollar spent on P or K gives a return equal to the minimum acceptable return on investment input by the user. This level is referred to as the target soil test level. The rate printed out at the target soil test level is equal to the amount of P or K removed in the harvested crop. If the suggested rate Table is followed, soil tests over time should increase or decrease to the target level.

Workshop groups were asked for the amount of P to apply during the first year and for long-term target soil test levels. Their recommendations are reported in the Table along with the output from PKMAN. The recommendations from the two classes were quite similar to each other and in most cases to the PKMAN output. The exception was the first year rate for the part-time farmer. This discrepancy was due primarily to too low a first year rate compared to the target soil test level suggested by the classes. When this was discussed with the classes, the groups agreed that the first-year rate would need to be increased to eventually build to the target soil test level. Thus the computer program generated recommendations similar to those developed intuitively by soil testing professionals. This exercise illustrates how grower circumstances can influence decisions about fertilizer rate, placement and timing. It also shows that computer tools can facilitate the personalization of soil test interpretation by agronomic practitioners and can be a valuable component of 4R Nutrient Stewardship programs. **Source:** Fixen, P. 1994. *In* L.S. Murphy (ed.) Proceedings Intensive Wheat Management Conf., Denver, Co., Potash and Phosphate Institute (now IPNI). p49-79.

Farmer type	First year rate			Target soil test		
	Class			Class		
	1	2	PKMAN	1	2	PKMAN
	lb P_2O_5/A			ppm		
Young renter	15	0	11	NA	NA	5
Well established	50	40	49	26	25	22
Expanding	25	0	33	14	10	14
Part-time	20	35	84	22	20	20

NA = Not appropriate; Initial soil test = 10 ppm.

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