Maximum Economic Yield and the Farmer . . . One Dealer's Experience with an MEY Club

By Henry Neutens and Mark D. Stauffer

Maximum economic yield (MEY) is alive and well. Although some consider the 1980s concept of 'more' crop production to be outmoded and not applicable in the 1990s, progressive farmers are realizing the economic advantage of producing more bushels per acre.

WHAT has dealer and farmer emphasis on MEY taught us? The best bottom line results when best management practices (BMPs) are integrated. Yield responses defined in maximum yield research (MYR) trials throughout North America (**Table 1**) identified BMPs such as:

- hybrid/variety selection
- weed, disease and insect management
- soil fertility requirements
- tillage systems
- plant populations
- planting dates.

These are critical inputs for crop production efficiency.

Dealers and farmers also challenged these yield barriers and learned the valuable lesson that good management through balanced and adequate inputs increased crop yields. Economists indicate that MEY is often 90 to 95 percent of **maximum yield**. Progressive farmers and dealers continue to actively pursue this goal.

One Dealer's Experience

Kent County Fertilizers, in cooperation with six farmers, started an MYR Club in 1980 after recognizing that corn growers in the heart of Ontario's corn belt had to improve to stay competitive. During the period 1981 to 1986, club members achieved yields as high as 198 bu/A. They established these ideas:

- Phosphorus (P) and potassium (K) soil tests below the 5-inch depth were not raised by greater than normal fertilizer application rates.
- Plant populations were often inadequate and corn hybrid x population interactions affected yields.
- Row widths varying between 30 and 38 inches had no effect on yield.

Subsequently, the Club re-directed its effort to focus on MEY while re-doubling its membership several times. Data from the first 5 years (1987-1991) of club activities are summarized in this article.

BMPs Help Stabilize Corn Yields

MEY Club corn yields were higher and more stable than average yields for

Table 1. Maximum yield research records for North America.

Crop	Yield/location USA	Canada
Corn, bu/A	338/New Jersey	293/Ontario
Soybeans, bu/A	118/New Jersey	96/Ontario
Wheat, bu/A	216/Washington	205/British Columbia
Alfalfa, tons/A/year	24/Arizona	9.7/Ontario

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Table 2. Corn and soybean yields and growing season conditions.

Year	Yield[1] MEY[2]	Yield[1] County	Row width, in.	Average dates Planted	Average dates Harvested	Harvest population, (000)	Rain, in.
	------ bu/A ------						
1987	158	135	36	May 3	Oct. 24	26.8	19.6
1988	143	92	36	May 3	Oct. 19	24.7	11.3
1989	147	132	36	May 6	Oct. 30	25.3	15.3
1990	143	132	36	May 6	Nov. 9	24.9	22.3
1991	145	95	35	May 8	Oct. 14	26.3	8.9

[1]Average yields. Sources: MEY club data and OMAF Policy Analysis Branch.
[2]Selected 2 acre sites from MEY fields. Number of farmers in the corn club are 32, 39, 46, 32, and 23, respectively, for the 5 years.

the county. The average county yield for corn between 1987 and 1991 was 117 bu/A, compared to the MEY Club average of 145 bu/A (**Table 2**). Corn yields varied over the 5-year period and particularly during the drought years of 1988 and 1991. A major benefit accruing to MEY Club members was the yield stability BMPs provide. Annual Club yields ranged from −3 percent to +7 percent of the 5-year Club average. Annual county yields varied between −21 percent and +15 percent of the 5-year county average.

Planting dates over the 5-year period ranged from as early as April 22 to as late as May 20. For each day of delay in planting after April 22, yield was reduced by 1.06 bu/A.

Plant population at harvest data substantiated what earlier MYR in Ontario revealed–that farmers in the area traditionally underplant corn by about 10 percent. The MEY Club data indicate that corn yields increased 1.6 bu/A for each 1,000 harvested plants/A as populations increased from 18,200 to 31,500.

Crop rotation practices benefitted both crop yield and the environment. Corn yields were greatest following soybeans, slightly less following wheat and much less in a corn-corn rotation (**Figure 1**).

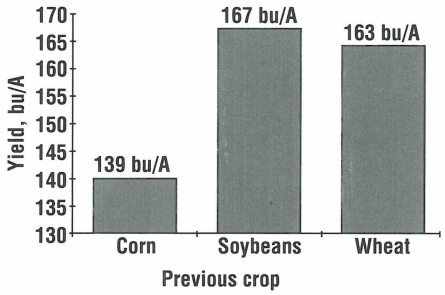

Figure 1. Effect of previous crop on corn yield (5-year average).

The 172 farm-years of data generated by the MEY Club provide these growers with regionally specific corn production guides. Equally valuable is the knowledge gained in understanding relationships between various management practices and crop yield.

Fertilizer Management– A Key to High Yields

Good soil fertility and adequate, balanced fertilizer management coupled with other BMPs helped boost Club yields. Higher yields resulted when more nitrogen (N), P, and K were available (**Table 3**). Top yields are most efficiently produced when nutrient supplies are bal-

Table 3. Fertilizer nutrient rates and BMPs associated with each yield category (average 1987-1991).

Yield category, bu/A	Yield, bu/A	Row width, in.	Plant date	Harvest population	Nutrient Applied N	P_2O_5	K_2O	Zn
					---------- lb/A ----------			
80-120	103	36	May 7	25,875	173	50	89	1
121-160	142	36	May 5	25,842	181	53	97	1
161+	171	35	May 2	27,184	198	63	107	1

anced. Soil test P and K values were high for all three yield categories (**Table 4**).

Table 4. Soil test levels for P and K for each yield category.

Yield category, bu/A	Average yield, bu/A	Soil test values	
		P	K
		------ ppm -------	
80-120	103	162	289
121-160	142	115	189
161+	171	119	254

Adequate and Balanced Nutrition for Most Efficient Yields

High yielding corn requires more total nutrients, but often those nutrients are used more efficiently because of the presence of adequate amounts of each nutrient and the utilization of other BMPs. Previous research has shown that nutrient uptake per unit of production for MEY corn is remarkably stable, suggesting a lack of luxury consumption with high nutrient availability. Split nutrient applications, particularly N, can have dramatic effects on N use efficiency as can the presence of adequate amounts of P and K.

Data from the Kent County MEY Club indicate that production in the highest yield category (161 bu/A up) required only 1.2 lb N/bu of grain compared to 1.7 lb of N/bu in the 80 to 120/A yield range. Continuing as one of the challenges of MEY production is to better understand fertilizer placement and timing effects on plant nutrient uptake and nutrient interactions.

MEY and Economic Sustainability

Top corn producers in the Kent County MEY Club verified the principle of MEY . . . that highest profits result when high yields are achieved (**Table 5**). Highest profits resulted when BMPs were integrated into effective and efficient production systems. These 172 farm-years of data indicate that highest yields were associated with substantially lowered production costs per bushel, a greatly elevated gross return and significantly higher net profits.

Clearly, the integration of BMPs into an MEY production system provided for all of the targeted aspects of crop production . . . higher input efficiency, reduced per unit production costs, higher overall profitability, and improved farm economic sustainability. The Kent County MEY Club members benefited from their mutual experiences and the sharing of knowledge that such joint activities generate. ■

Table 5. Production costs and net return summary for MEY Club corn production.

Yield category, bu/A	Average yield, bu/A	Production cost		Gross return @ $2.60/bu,	Net profit (no land cost)	
		$/A	$/bu	$/A	$/A	$/bu
80-120	103	228	2.22	269	41	0.38
121-160	142	240	1.70	370	130	0.90
161+	171	231	1.36	445	213	1.24

Cost of land is excluded from the calculation.

Nutrient Assessment . . . from page 28

agents are being encouraged to include manure management in their plans of work and to share this information with their county commissioners and advisory boards.

Extension agents are being encouraged to use the animal distribution maps that were developed to initiate discussions with livestock and poultry producers on the need to consider dispersing livestock operations to prevent "clustering" of animal units that might serve as point sources of water contamination if they exceed the crop nutrient needs of the area.

Meetings with the fertilizer industry are being conducted to discuss the potential impact of these findings on sales and to explore opportunities for incorporating organic sources into existing fertilizer operations. ■