Banded Fertilizers

As in past years, several PFI cooperators evaluated starters and other banded fertilizers in 1994. By now it should be no surprise that results were mixed. Even where these fertilizers increased crop yields, there was sometimes no clear economic advantage.

Even before the advent of color photography Ron Rosmann holding court at field days



Doug Alert and Margaret Smith, Hampton, were among the ridge-tillers trying out the deep placement applicator shoe for the Buffalo planter. In soybeans, the fertilizer, placed two inches directly below the seed, increased yield 3.1 bushels, but the benefit was less than the cost of the 2-6-12 suspension fertilizer (<u>Table 1</u>). In the corn trial, Doug and Margaret compared placement below the seed, two inches to the side, and a no-starter check treatment (<u>Table 3</u>). Their soil tests very high in phosphorus and high in potassium. There was no observable yield difference among the three treatments. Don and Sharon Davidson, Grundy Center, also used the deep banding planter shoe in a soybean trial (<u>Table 1</u>). There was no significant effect on yield. Jeff and Gayle Olson, Mt. Pleasant, evaluated a planter band too, this one two inches to the side of the soybean seed and consisting of just potash fertilizer (<u>Table 3</u>). There was no yield effect. The potassium soil test there is between medium and high.

The usual method of deep banding involves a separate pass with an implement in the fall. **Harlan and Sharon Grau**, Newell, took this approach, comparing a fall deep band, fall broadcast, and a no-fertilizer check treatment. The corn in the deep band treatment yielded significantly better than the check treatment (nearly 16 bushels), with the broadcast treatment falling in between (<u>Table 3</u>). Soil tests are medium-to-very-high for phosphorus and high-to-very-high for potassium. Different results were obtained by Allen and Jackie Tibbs, Alden, who no-till planted soybeans directly over a fall band of fertilizer. They reported no yield increase from the fertilizer band (<u>Table 1</u>). The soil on this field tests low -to-medium for phosphorus and high for potassium.

Ron and Maria Rosmann, Harlan, have put their home farm in a transition to organic certification. They evaluated two rates of a mined rock phosphate on soybean yield, but saw no effect (<u>Table 1</u>). Their soil test for phosphorus was already medium-to-high.

Ray and Marj Stonecypher, Floyd, evaluated 3-18-18, a low-salt starter, which they placed right with the corn seed (<u>Table 1</u>). The 11 gallon per acre rate amounted to about 1+6+6 of nitrogen, phosphate, and potash. Surprisingly, leaf tissue tests showed a reduction in both nitrogen and magnesium where the starter had been applied. For the third year running, the Stonecyphers saw no yield effect from a low -salt starter. Their soil tests very high in P and K.

Probably the most ambitious starter trials in 1994 were carried out by **Dick and Sharon Thompson**, Boone, who evaluated both starters and timing of manure applications for corn and for soybeans (<u>Table</u> <u>2</u>). How do you test both manure timing and starters in one trial? They used what is called a "split plot" design. The "main plots" represented different manure application times - fall (in the corn trial), spring, and a no-manure check plot. Each of these main plots was split into a subplot with starter fertilizer and one without starter, the location of each subtreatment being chosen at random.

In the Thompsons' soybean trial neither manure nor starter affected yields measurably. However, in the corn trial, both manure and starter had an effect on yield. Fall applied manure was significantly better than the no-manure treatment, with spring- applied manure in between. The highest yielding treatment was fall-manure-plus-starter. However, because of spreading costs even this treatment lost money compared to the no-manure-no-starter treatment. <u>Table 2</u> shows the economics calculated both for inyear costs and "prorated" spreading costs. Dick Thompson distributes spreading costs across all the crops of the five-year rotation, with each crop's charge weighted according to its nutrient withdrawal. It's worth noting that this field has been manured two or three years out of five for some time, so all treatment yields reflect the long-term benefits of manure. Soil tests for P and K are both very high here.

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Table 1. STA	RTER & (OTHER FERTILITY TR	IALS		STARTER & OTHER FERTILITY TRIALS									
		TREATMENT "A'	,	TREATMENT "B"		TRT "B"		DIF	FERE	NCE				
COOPERATOR	CROP	DESCRIPTION	YIELD (bu.)	DESCRIPTION		YIELD (bu.)	YIELD DIFF.	YLD LSD (bu)	YLD SIG.	\$ BENEFTT OF TRT "A"	COMMENT			
ALERT	SOYBEANS	STARTER, 2" BELOW SEED	46.2	NO STARTER		43.1	3.1	19	*	(\$6.63)	8+24+48 AS 2-6-12 SUSPENSION			
DAVIDS ON	SOYBEANS	STARTER FERTILIZER	37.6	NO STARTER		37.9	-0.3	1.8	N.S.	(\$6.33)	2+7+13 AS 2-6-12 1" BELOW SEED. HP204 EDIBLE BEANS			
STONECYPHER	CORN	STARTER ON SEED	143.1	NO STARTER		150.6	-7.5	10.9	N.S.	(\$9.45)	1+6+6 IN STARTER			
ROSMANN	SOYBEANS	45 LB/ACRE ROCK PHOSPHATE	69.0	7.5 LB/ACRE ROCK PHOSPHATE		69.2	-0.3	0.9	N.S.	(\$3.75)	BLACK PHOSPHATE METERED THROUGH PLANTER INSECTICIDE BOXES. SOIL P1 TEST=21 PPM (HIGH)			
TIBBS	SOYBEANS	BANDED 22+70+90	54.5	NO FERTILIZER		53.6	0.8	1.7	N.S.	(\$33.82)	BEANS PLANTED DIRECTLY OVER FALL DEEP BAND. THREE REPS ONLY.			
FRANTZEN	CORN	80+8+50 AFTER BERSEEM CLOVER	171.1	20+8+50 AFTER BERSEEM CLOVER		169.1	2.0	8.1	N.S.	(\$13.38)	LATE SPRING SOIL NITRATE: HIGH RATE 77 PPM, LOW 71 PPM. STALK NITRATE: 673 PPM HIGH RATE, 605 PPM LOW RATE			
LUBBEN	SOYBEANS	ACAW. HERBICIDE ON 6/27	62.7	NO ACA, JUST HERBICIDE		62.8	-0.1	2.3	N.S.	(\$4.14)	UNRANDOMIZED TRIAL, STATISTICS WEAKENED			
OLSON	SOYBEANS	GROZYME™ /AGRI-SC™ PREPLANT BAND	63.9	ZERO CHECK		65.0	-1.0	5.2	N.S.	(\$10.76)	GROZYME™ SAID TO RELEASE SOIL NUTRIENTS, AGRI-SC SOLD AS SOIL CONDITIONER			
OLSON	CORN	GROZYME TM /AGRI-SC TM POST BAND	165.2	ZERO CHECK		164.0	1.2	16.1	N.S.	(\$10.76)				
STOCK	SOYBEANS	ACHIEVE TM & REMEDY TM PREPLANT BROADCAST	54.0	ZERO CHECK		53.0	1.0	6.3	N.S.	(\$13.85)	BIOLOGICAL EFFECT SOMEWHAT CONFOUNDED WITH STRIP "SIDE"			
STOCK	CORN	ACHIEVE TM & REMEDY TM PREPLANT BROADCAST	159.5	ZERO CHECK		160.5	-1.0	9.6	N.S.	(\$13.85)	(NORTH-SOUTH) EFFECT			
WURPTS	SOYBEANS	BIOLOGICAL FERTILITY PROGRAM	60.6	ISU FERTILITY RECOMMENDATIONS		60.3	0.3	2.3	N.S.	(\$8.75)				
WURPTS	CORN	BIOLOGICAL FERTILITY PROGRAM	184.7	ISU FERTILITY RECOMMENDATIONS		187.3	-2.6	7.2	N.S.	(\$10.11)				

Table 2. MANURE TIMING AND STARTER FERTILIZER

MANURE TIMING AND STARTER FERTILIZER

			TRE	ATMENT		TREATMENT "B"					TREATMENT "C"							
	PREVIOUS CROP	YIELD SIGNIFI- CANCE	DESCRIPTION	YIELD (bu or T)	STAT.	TRT COST S	\$ BENEFIT	DESCRIPTION	YIELD (bu or T)	ST AT.	TRT COST S	\$ BENEFIT	DESCRIPTION	YIELD (bu. or T)	STAT.	TRT COSTS	\$ BENEFIT	OVERALL COMMENTS
			NO MANURE, NO STARTER	165.9	b	\$0.00	\$0.00	FALL, NO STARTER	170.8	ab	\$21.66	(\$21.66)	SPRING, NO STARTER	170.0	ab	\$21.66	(\$21.66)	
CORN	SOYBFANS	*	(PR	ORATED C	COST ¤)	\$0.00	\$0.00	(PR	ORATED C	OST ¤)	\$17.73	(\$17.73)	(PRORA	TED C	OST ¤)	\$17.73	(\$17.73)	
C OILI	SOT DERITO		NO MANURE, STARTER	170.1	ab	\$6.37	(\$6.37)	FALL, STARTI	ER 173.8	a	\$28.04	(\$12.24)	SPRING, STARTER	171.0	ab	\$28.04	(\$28.04)	
			(PRORATED COST ≈)			\$6.37	(\$6.37)	(PR	(PRORATED COST ∞) \$24.10		\$24.10	(\$8.31)	(PRORA	OST ¤)	\$24.10	(\$24.10)		
MAIN FEI	TECT.					o												
			NO MANURE	168.0	Ъ	00.0\$	\$0.00	FALL MANUR	E 172.3	a	\$21.66	(\$13.00)	MANURE	170.5	ab	\$21.66	(\$21.66)	
			(PR	ORATED C	COST ¤)	\$0.00	\$0.00	(PR	ORATED C	OST ¤)	\$17.73	(\$9.06)	(PRORA	TED C	OST ¤)	\$17.73	(\$17.73)	
		ER	NO STARTER	168.9	b	\$0.00	\$0.00	STARTER FERTILIZER	171.6	a	\$6.37	(\$0.96)						
				69 <i>5</i>	a	\$0.00	\$43.80	SPRING, NO STARTER	70.5	a	\$21.66	\$22.14						LATE SPRING SOIL NITRATE 38 PPM, FALL STALK NITRATE LOW IN
SO YBE ANS	CORN	N.S.	(PR	ORATED C	COST =)	\$0.00	\$35.65	(PR	ORATED C	OST =)	\$13.51	\$22.14						ALL TRT S
			NO MANURE, STARTER	68.7	a	\$22.14	\$21.66	SPRING, STARTER	69.2	a	\$43.80	\$0.00						
			(PR	ORATED C	COST ¤)	\$22.14	\$13 <i>5</i> 1	(PR	ORATED C	COST ¤)	\$35.65	\$0.00						
	TE OTL	0				0												
			NO MANURE	69.8	a	00.0\$	\$21.66	SPRING MANURE	69.8	a	\$21.66	\$0.00						
			(PR	ORATED (COST ¤)	\$0.00	\$13.51	(PR	ORATED C	OST ¤)	\$13.51	\$0.00						
		R	NO STARTER	70.0	a	\$0.00	\$22.14	STARTER FERTILIZER	69.0	a	\$22.14	\$0.00						
	CORN MAIN EFI MANURE SUB EFFE STARTER SOYBEANS MAIN EFI MANURE SUB EFFE	CORN SOYBEANS MAIN EFFE CT: MANURE TIMING SUB EFFECT: STARTER FERTILIZI SOYBEANS CORN MAIN EFFE CT: MANURE TIMING MAIN EFFE CT: MANURE TIMING	CROPMAE VIOUS CROPSIGNIFF CANCECORNSOYBEANS*MAIN EFFE CT: MANURE TIMING	CROPPREVIOUS GROPYIELD SIGNEL CANCEDESCRIPTIONCORNSOYBEANS*NO MANURE, NO STARTER (PRALIN EFFE CT: MANURE TIMINGNO MANURE, STARTER (PRMAIN EFFE CT: STARTERNO MANURE (PRSUB EFFE CT: STARTERNO STARTER (PRSOYBEANSCORNN.S.SOYBEANSNO STARTER (PRSOYBEANSN.S.NO MANURE, STARTER (PRSOYBEANSCORNN.S.SUB EFFECT:NO MANURE </td <td>CROPPREVIOUS (ROPYIELD SIGNIFL CANCEDESCRIPTIONYIELD (Pu or T)CORNSOYBEANS\starNO MANURE, NO STARTER165.9SOYBEANS\starNO MANURE, STARTER170.1MAIN EFFECT: MANURE TIMINGNO MANURE168.0MAIN EFFECT: STARTER FERTILIZERNO STARTER168.9SOYBEANSCORNN.S.NO MANURE, PO STARTER69.5SOYBEANSCORNN.S.NO MANURE, STARTER69.5SOYBEANSCORNN.S.MO MANURE, STARTER69.5SOYBEANSCORNN.S.MO MANURE, STARTER69.5SOYBEANSCORNN.S.MO MANURE, STARTER69.5SOYBEANSCORNN.S.MO MANURE, STARTER69.5SOYBEANSMO MANUREMO MANURE69.8MAIN EFFECT: MANURE TIMINGMO MANUREMO MANURE69.8MAIN EFFECT:NO STARTERMO MANURE70.0</td> <td>CROP PKE UUUS (ROP SIGNEF CANCE DESCRIPTION IND (bu or T) STAT. 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 $^{\otimes}$ PRORATED MANURE APPLICATION COSTS CALCULATED ON THE BASIS OF NUTRIENT WITHDRAWAL OF THE CROP IN THE FIVE-YEAR ROTATION.

Table 3. MULTIPLE-TREATMENT PLANT POP. & FERTILIZER TRIALS										MULTIPLE- TREATMENT PLANT POP. & FERTILIZER TRI								R TRL	LS	
TREATMENT "A"										TI	TREATMENT "B" TREATMENT "C"							"C"	14	
COOPERATOR	CROP	PREVIOUS CROP	YIELD SIGNIFI- CANCE	DESCRIPTION	YIELD (bu or T)	ST AT.	TRT COSTS	\$ BENEFIT		DESCRIPTION	YIELD (bu or T)	STAT.	TRT COST S	\$ BENEFTT	DESCRIPTION	YIELD (bu or T)	STAT.	TRT COSTS	\$ BENEFIT	OVERALL COMMENTS
RICEVILLE FFA	NK4242	CORN	*	24,200 SEED S/ACRE (22,200 PLANTS)	151.7	c	\$27.19	\$0.00		27,700 SEEDS 25,400 PLNTS	158.7	b	\$31.13	\$10.11	32,000 SEEDS 28,200 PLNTS	162.9	a	\$35.96	\$13.68	
RICEVILLE FFA	P3751	CORN	*	24,200 SEED S/ACRE (22,200 PLANTS)	141.8	c	\$24.73	\$0.00		27,700 SEEDS 25,400 PLNTS	144.6	b	\$28.31	\$1.89	32,000 SEEDS 28,200 PLNTS	150.2	a	\$32.70	\$8.76	
ROSMANN		SO Y BEANS	*	21,950 SEED S/ACRE (16,840 PLANTS)	136.7	c	\$18.59	\$0.00		24,400 SEEDS (19,800 PLANTS)	146.1	b	\$20.67	\$16.68	28,200 SEEDS (23,760 PLANTS)	157.7	a	\$23.89	\$36.76	LATE SPRING SOIL NITRATE 38 PPM, FALL STALK NITRATE LOW IN ALL TRTS
ALERT		SO Y BEANS		20 LBS P, 40 LBS K 2" BELOW SEED (DEEP PLANTER SHOE)	137.0	a	\$34.59	\$0.00		20 LBS P, 40 LBS K TO THE SIDE OF THE SEED	140.2	a	\$34.59	00.08	CHECK TREATMENT: NO BANDED P & K	136.9	a	\$22.30	\$12.29	TWO REPS DISCARDED BECAUSE OF MISSING DATA
GRAU		SOY BEANS	*	BROADCAST P & K	174.4	ab	\$28.73	(\$28.73)		DEEPBAND P & K	182.1	a	\$29.41	\$2.26	CONTROL (NOFERT.)	166.3	b	\$0.00	\$0.00	TREATMENT \$ BENEFIT IS RELATIVE TO CONTROL TRT
OLSON	SO Y BE ANS	CORN	N.S.	75 LB K PLANTER BAND	64.2	a	\$9 <i>.</i> 50	\$9 <i>.</i> 50		150 LB K PLANTER BAND	65.4	a	\$19.00	\$0.00	ZERO K	61.2	a	\$0.00	\$19.00	SOIL K TEST: 125 PPM, MEDIUM-HIGH
NEELEY-		SOY	*	0 LBS ANHYDROUS NITROGEN	136.4	b	\$0.00	\$0.00		75 LBS ANHYDRS. N	154.3	ab	\$8.63	(\$8.63)						* RATE SET W. SOIL NITR. TEST
KINYON	CORIT	BEANS								* 110 LBS ANHYDRS. N	166.7	a	\$12.65	\$48.83	150 LBS ANHYDRS, N	167.5	a	\$17.25	\$44.23	THREE REPS ONLY