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Conclusions

All fertilizer and interplanted legume treatments increased the yields of Johnsongrass. Yields were significantly increased the first year by interplanted roughpea and by roughpea, black medic, and Persian clover the second year. It is most likely that the other legumes would follow the same pattern in a year or more when they became more strongly established.

Increases in yield of Johnsongrass due to potash were negligible and yields the second year were practically the same as the first year.

The application of 32 pounds of nitrogen increased the yield of Johnsongrass approximately 36 percent, and this increase was constant for the two years.

The three rates of phosphorus applied alone or in combination increased yields the second year. The yield following phosphorus alone the second year was the same as that from nitrogen alone. All fertilizer treatments containing phosphorus gave significant responses, and the responses increased the second year over the first.

Use of phosphorus with nitrogen increased the efficiency of nitrogen in the production of Johnsongrass. This increase was greater (15 percent) when used with an interplanted legume.

The addition of phosphorus increased the yields of Johnsongrass due to the increased growth of interplanted legumes.

The calcium content of the legumes was not altered by the addition of fertilizers.

The average phosphorus content of the legumes was increased 30 percent by applications of phosphate alone or in combination with nitrogen or potash, or with both.

The crude protein of the legumes was increased by nitrogen and phosphate.

The phosphorus content of Johnsongrass was increased by application of fertilizers. This increase was greater following interplanted legumes.

The crude protein content of Johnsongrass was increased by fertilizer. This increase was due to applications of nitrogen alone or in combination with other fertilizers. The increases were greater with interplanted legumes. This emphasizes the importance of higher rates of fertilization with Johnsongrass.

INTERPLANTED LEGUMES IN JOHNSONGRASS

By HUGH W. BENNETT and N. C. MERWINE[1]

Lower production costs and increased efficiency are no less important to agriculture than to other types of industry. Efficiency in most Mississippi livestock enterprises is directly related to production of homegrown feeds. Pasture provides the cheapest and best source of nutrients but stored forage is necessary for adequate year-round feeding programs.

Johnsongrass, **Sorghum halepense (L.) pers.,** was introduced into the "Black" or "Prairie" Belt of Mississippi and Alabama some 130 years ago as a forage plant of superior value. It is so well adapted to the well-drained lime soils that, intentionally or unintentionally, it became prevalent over all the area. For many years, it was utilized mainly as a hay crop. The growth of the livestock industry in this area has resulted in Johnsongrass being used to good advantage in a system of year-round grazing and silage, as well as for hay.

The interplanting of legumes in Johnsongrass has been recommended, and used to some degree, to develop more uniform seasonal production. The grazing season could be lengthened by growing a winter or early spring crop which would make its growth before Johnsongrass came into its heaviest production. This would permit a more uniform stocking rate for pastures on a yearly basis, reduce the necessity of buying or selling on unfavorable livestock markets to maintain a proper pasture grazing load, and enable the operator to preserve quality hay or silage during peaks of production.

It is the purpose of this bulletin to present the effects of associated legumes, with and without fertilizer, on the production of Johnsongrass.

Materials and Methods

An experiment was conducted on first-year established Johnsongrass to determine the effects of interplanted legumes under annual applications of various amounts of fertilization.

Six legume treatments were used, namely; no legume, black medic (**Medicago lupulina** L.), Roughpea (**Lathyrus hirsutus,**L.), Persian clover (**Trifolium resupinatum** L.), white clover (**Trifolium repens** L.), and low hop clover (**Trifolium procumbens** L.). Roughpea is commonly known as wild winter pea in Mississippi, as Caley pea in Alabama, and Singletary pea in Louisiana.

Fifteen fertilizer treatments consisted of the following: 32 pounds of N; 30, 60, and 90 pounds of P_2O_5; and 50 pounds of K_2O per acre—either alone or in combination. The combination of nitrogen and potassium was omitted because previous work showed that this soil did not respond to potash. The mineral fertilizers were applied each fall before legume growth began, and the nitrogen treatments in early summer and after the legumes were clipped.

The various legume and fertilizer treatments were replicated 8 times in a randomized split plot design on a shallow phase of Sumter clay soil. The le-

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Table 1. Yields of Johnsongrass following various interplanted legumes. Average of all fertilizer treatments.

Legume	First year Harvest		Second year Harvest	
	1st	2nd	1st	2nd
	Pounds green weight per acre			
Black Medic	7143	14846	5879**	22529
Roughpea	7111	18039	5949**	26016
Persian clover	6065	15509	4744	19643
White clover	5913	13035	5135	17088
Low hop clover	5738	15400	4093	16280
No legume	5981	15556	4397	16035
LSD				
05	1298	1520	808	3047
01	1743	2040	1105	4089

gumes were clipped at the flowering stage and removed from the plots. The Johnsongrass was clipped twice each year, once in late May or early June and again in late August or early September. Chemical analyses were made on samples composited from each replication. Duplicate analyses were made on samples from each treatment or combination of treatments.

The soil was a high lime (pH 8) shallow clay from chalk 20-25 inches deep. This soil is generally well supplied with potash and fairly well with phosphorus. The high lime content often ties up phosphorus to cause a deficiency. This is a common limestone prairie soil, generally unsuited to row crops, but recommended for pasture and hay crops. Corn yields, with no fertilization on this area had averaged 8 bushels per acre for a 4-year period prior to the test.

Experimental Results

Highly significant differences in total yields of Johnsongrass were found among fertilizers and legumes. Interaction between fertilizers and legumes was not significant, and the data were analyzed separately for fertilizers and legumes.

In the first year of the test, there were no significant differences in yields of Johnsongrass for the first harvest among the legumes. Two highly significant differences were found in the second harvest. The yield of Johnsongrass following roughpea was higher at the 1 percent level than that following no legume while a significantly lower (1 percent level) yield was obtained following white clover. Second year first harvest yields were significantly higher following roughpeas and black medic than following Persian clover. These data are given in table 1.

A combination of factors may help to explain the above results. White clover is a low-growing, dense plant which offered more competition to the establishment of Johnsongrass in the first year. This delayed the strong establishment until the second year when the grass yield was slightly higher, than the yield following no legume. White clover is the only legume used in the test that continued to grow past the spring season. This added competition to Johnsongrass establishment before the clover was producing an appreciable amount of nodules for decomposition. Roughpeas are well adapted to this eroded soil and consistently produced higher yields than the other legumes used. This would indicate a greater amount of root material left in the soil to decompose and furnish nitrogen for the grass crop. Availability of nitro-

gen from nodules of the two crops also may have been a factor.

Since the test was conducted only two years, and Persian clover showed significant increases the second year, it seems likely that the other legumes would follow the same pattern when they became more strongly established.

Several significant differences were found among the fertilizer treatments. The first harvest of the first year showed no differences among fertilizer treatments, but highly significant increases occurred in all other harvests where fertilizer had been used. (Table 2.)

No response was obtained from the application of 50 pounds of K_2O per acre when applied alone. Applications of K_2O in combination with phosphorus or phosphorus plus nitrogen gave significantly higher yields than where potash was applied alone or where no fertilizer was used. These combinations with potash, however, produced no significantly higher yields than the combinations without potash.

Nitrogen, alone or in combination with phosphorus, produced highly significant increases in the yield of Johnsongrass. The second harvest of the first year showed a trend of increase due to application of phosphorus with nitrogen. In the second year, both harvests gave highly significant increases for all fertilizer applications containing nitrogen. Nitrogen and phosphorus in combination gave higher yields (approximately twice that of either nitrogen or phosphorus alone) than the application of nitrogen alone. Thirty-two pounds of nitrogen applied when legumes were removed produced approximately the same increase whether applied alone or in combination with phosphorus. This amount was approximately 8,000 pounds of green weight per acre and represents 9 to 10 pounds of nitrogen as determined from composited forage analyses.

Phosphorus alone did not show any significant difference in yield over no fertilizer in the first year. Highly significant increases over check were obtained from the second application of all three rates of phosphorus. It will also be noted that highly significant increases over check were obtained in the second cutting the first year, where all rates of phosphorus were combined with nitrogen

Table 2. Yield of Johnsongrass with various applications of fertilizer. Average of yields following all interplanted legumes.

Fertilizer Lbs. Per N	P_2O	Acre K_2O	First year Harvest 1st	First year Harvest 2nd	Second year Harvest 1st	Second year Harvest 2nd	Average Harvest 1st	Average Harvest 2nd
			Pounds green weight per acre					
0	0	0	6364	11,327	3403	14,169	4884	12,748
32	0	0	6069	18,457	4634	18,735	5352	18,596
0	30	0	5405	10,425	4129	17,402	4767	13,914
0	60	0	7033	11,191	4333	18,604	5683	14,898
0	90	0	6426	11,213	4663	19,750	5545	15,482
0	0	50	5400	12,337	3460	14,140	4430	13,238
32	30	0	6761	20,107	5774	22,410	6268	21,258
32	60	0	6727	18,882	6234	23,505	6530	21,194
32	90	0	5939	19,132	6165	22,668	6052	20,900
0	30	50	6523	11,094	4566	16,914	5550	14,004
0	60	50	6012	13,193	4447	18,672	5230	15,932
0	90	50	6693	16,233*	4940	19,024	5817	17,629
32	30	50	6500	17,912**	5893	21,361	6197	19,637
32	60	50	6614	19,608**	6608*	23,573	6611	21,591
32	90	50	6404	19,829**	6239	22,306	6322	21,068
LSD								
05			987	4203	669	2343		
01			1305	5564	891	3171		

Table 3. Average yield of Johnsongrass with various applications and combinations of fertilizers. Averages of yields following all interplanted legumes.

Fertilizer[1]	First year Harvest 1st	First year Harvest 2nd	Total	Second year Harvest 1st	Second year Harvest 2nd	Total	Average Harvest 1st	Average Harvest 2nd	Total
			Pounds	green	weight per	acre			
0	6364	11327	17691	3403	14169	17572	4884	12748	17632
N	6069	18457	24526	4634	18735	23369	5352	18596	23948
P	6288	10943	17231	4375	18585	22960	5298	14765	20096
K	5400	12337	17737	3460	14140	17600	4430	13238	17668
NP	6476	19374	25850	6091	22861	28952	6283	21117	27600
PK	6409	13507	19916	4651	18203	22854	5532	15855	21387
PKN	6506	19116	25622	6247	22413	28660	6377	20765	27142

[1]N=32 lbs. K=50 lbs K_2O; P=average of 30, 60, and 90 lbs. of P_2O_5 per acre.

or potash.

Table 3 shows the average yield of Johnsongrass with the various applications and combinations (three rates of phosphorus averaged alone and in combination) of fertilizers. Green weight yields in pounds per acre are averages of yields following all interplanted legumes. These data show that the yields from plots receiving no fertilizer treatment and those receiving 50 pounds of K_2O per acre were relatively constant for both years, and both were the same. There was considerable increase in yield due to the application of 32 pounds of N per acre over that of no treatment, but this increased yield also remained constant for both years. Application of the three rates of phosphorus alone or in combination gave increasing yields the second year over the first year. The combination of the three rates of phosphorus with nitrogen and potash increased yields the second year, but they were approximately the same as the combination of phosphorus and nitrogen without potash. All treatments containing phosphorus gave significant responses the second year. This would eliminate the possibility of a more favorable growing season in the second year as cause for the increase. Thirty pounds of P_2O_5 applied each year produced a yield comparable to 90 pounds the first year. It appears that 60 pounds of P_2O_5 applied annually, alone or in combination with nitrogen, would give the most economical increase.

The acre increase in yield of Johnsongrass due to applications of fertilizer is shown in table 4. These increases are averages of the yields following all interplanted legumes. It should be pointed out that the trend in the first year is to show response only to nitrogen, and almost all of this increase was in the second cutting. The yield following phosphorus alone during the second year was approximately the same as that from nitrogen alone. It should be emphasized that the addition of phosphorus to nitrogen gave twice the increase in yield as either applied alone. Also, the yield of the second year was increasing, while the yield from treatments receiving nitrogen alone remained the same. The yield from treatments receiving potash alone were not increased over those obtained from the no fertilizer treatments. Addition of phosphorus to the potash gave increases in Johnsongrass yields. Much of this increase can be attributed to the effects of the increased growth of the interplanted legumes.

It is apparent (Table 5) that the yields of all the legumes were increased by applications of phosphorus, whether alone or in combination with nitrogen or potash, or with both. The application of potash with phosphorus gave no increase in legume growth over that obtained with

Table 4. Pounds per acre and percent increase in the yield of Johnsongrass over no treatment due to the application of fertilizers alone and in combination. Green weight averages following all interplanted legumes.

Fertilizer[1]	First year Harvest 1st	First year Harvest 2nd	First year Total	Second year Harvest 1st	Second year Harvest 2nd	Second year Total	Average Harvest 1st	Average Harvest 2nd	Average Total
None	6364	11327	17691	3403	14169	17572	4884	12748	17632
N									
pounds increase	—295	7130	6835	1231	4566	5797	468	5848	6316
percent increase	—4.6	63.0	38.6	36.2	32.2	34.1	9.6	45.9	35.8
P									
pounds increase	—76	—384	—460	972	4416	5388	414	2017	2464
percent increase	—1.2	—3.5	—2.7	28.6	31.2	30.7	8.5	15.8	14.0
K									
pounds increase	—964	1010	46	57	29	28	54	490	36
percent increase	—15.2	8.9	0.2	1.7	0.2	1.6	1.1	3.8	0.2
NP									
pounds increase	112	8947	8159	2688	8692	11380	1399	8369	9968
percent increase	1.8	71.0	46.1	79.0	61.3	64.8	28.7	64.7	56.5
PK									
pounds increase	45	2180	2225	1248	4034	5282	648	3107	3755
percent increase	0.7	19.3	12.6	36.7	28.5	30.1	13.3	24.4	21.3
PKN									
pounds increase	142	7789	7931	2844	8244	11088	1493	8017	9510
percent increase	2.2	68.8	44.8	83.6	58.2	63.1	30.6	62.9	53.9

[1]See footnote 1, table 3.

Table 5. Two-year average yield of interplanted legumes. Eight replications.

Fertilizer Lbs. Per Acre N	P_2O_5	K_2O	Black medic	Roughpea	Legume Persian clover	White clover	Low hop clover	Average All legumes
				Pounds of green weight per acre				
0	0	0	5119	6466	4180	4452	2586	4561
32	0	0	4805	6317	4765	4261	3362	4702
0	30	0	6221	7528	7937	6875	4860	6684
0	60	0	5594	8809	6670	6807	3989	6609
0	90	0	6126	8577	8944	5410	4900	6791
0	0	50	3771	5350	4180	3675	2627	3921
32	30	0	5854	5894	6848	6508	2818	5584
32	60	0	5500	9420	5540	6262	5078	6360
32	90	0	6902	7937	6262	5473	5677	6450
0	30	50	5309	7787	5364	4696	3770	5385
0	60	50	6398	9284	6630	5881	5582	6755
0	90	50	5268	8890	6085	5078	3812	5827
32	30	50	5309	7420	5813	3580	5037	5432
32	60	50	6630	9489	6984	5540	3989	6526
32	90	50	5486	10006	6766	5813	4942	6603

Table 6. Two-year average yields of interplanted legume yields. Total average of 3 rates of phosphorus alone and in combination with nitrogen and potash.

Fertilizer[1]	Black medic	Roughpea	Persian clover	White clover	Low hop clover	Average all legumes
			Pounds green weight per acre			
None	5119	6466	4180	4452	2586	4561
N	4805	6317	4765	4261	3362	4702
P	5980	8271	7850	6362	4583	6609
K	3771	5350	4180	3675	2627	3921
NP	6081	7750	6217	6081	4583	6143
PK	5658	8654	6026	5218	4388	5981
PKN	5808	8622	6520	4978	4814	6160
Average all fertilizer	5351	7696	5926	5096	4060	5586
Average all fertilizer with phosphorus	5880	8324	6653	5660	4592	6226

[1]Footnote 1, Table 3.

phosphorus alone except in the case with roughpea. Legume growth was no better when fertilized with potash alone than when no fertilizer was applied.

The average yields of the three rates of phosphorus applied alone and in combination with nitrogen and potash are summarized in table 6. This further emphasizes that increases in legume growth on this soil are due mainly to the application of phosphorus.

The growth of legumes favorably affected the response of Johnsongrass to phosphorus as shown in table 7. The yields with phosphorus were reduced the first year. With roughpea the yield of Johnsongrass was 21.2 percent better than from plots with phosphorus but without roughpea. This difference amounted to 3,502 pounds of green weight per acre. The second year gave a 25.8 percent increase in yield due to the second application of phosphorus where no legume was used, but there was nearly four times as much increase following roughpea. This was a 65 percent, or 12,632 pounds, increase in green weight per acre. The application of 32 pounds of N to the phosphate treatment had its usual additive effect. The nitrogen with the phosphorus eliminated the first-year decrease with or without roughpea. The in-

crease the second year without interplanting was approximately the same as the first year. The increase the second year with interplanted roughpeas amounted to 14,320 pounds of green weight per acre. The nitrogen from the legume added to the 32 pounds of N applied shows that Johnsongrass will respond to much higher rates of nitrogen. Even at this low rate of N, the associated roughpea raised the yield of Johnsongrass 12,605 pounds per acre over the same fertilized Johnsongrass which was grown without roughpea. The trend of yield with roughpea was higher but typical for the other legumes used.

The stimulated legume growth would leave a larger amount of nitrogenous material in the soil which would increase the growth of Johnsongrass due to the released nitrogen. The phosphated legumes also contain more phosphorus and should protect a certain amount of phosphorus from becoming unavailable in this high lime soil. Both of these factors would accumulate for a period when an equilibrium between accumulation and decomposition would be reached.

Three green weight yields of the legumes (Table 6) show an increased annual production of approximately 1 to 1½ tons of legume hay, or its equivalent in high quality pasturage. It should be emphasized that this additional yield, produced during the winter and early spring, could be utilized most efficiently. In this test this growth was removed and the increased Johnsongrass growth came from the roots of the legumes.

The chemical composition of the harvested legume top-growth produced under the various treatments is given in Table 8. These results were obtained by duplicate analyses of composited samples as indicated in this table.

The calcium content of the legumes was not altered to any great extent by the addition of the mineral fertilizers. The application of potassium alone appeared to increase the calcium content, whereas the addition of nitrogen tended to lower it.

The application of phosphate increased the phosphorus content of the legumes except in the case of black medic. The phosphorus content of Persian clover was doubled by the addition of phosphate in combination with nitrogen or potash or with both, and there was a 92 percent increase due to phosphate alone. The phosphorus content of white clover was increased 68 percent and a 57 percent increase in the phosphorus content of roughpeas was noted. The phosphorus content of all legumes was increased 30 percent by the addition of phosphate alone or in combination with nitrogen or potash or both.

The crude protein of the legumes was increased by nitrogen and phosphate, alone and in combination. This increase amounted to 12 percent when the average

Table 7. Johnsongrass yield following rough pea and no legume.

Fertilizer[1]	Year	No legume		Roughpea		Increase over no roughpea	
		Pounds per acre	Increase	Pounds per acre	Increase	Pounds	Percent
		Pounds of green weight per acre					
None	1st	17254		21181		3927	22.8
	2nd	15455		23550		8095	52.4
N	1st	25700	8446	26980	5799	1280	5.0
	2nd	19575	4120	29267	5717	9692	49.5
P	1st	16553	—701	20555	—626	3502	21.2
	2nd	19439	3984	32071	8521	12632	65.0
PN	1st	26871	9617	29703	8522	2832	10.5
	2nd	25265	9810	37870	14320	18605	49.9

[1]Footnote 1, Table 3.

Table 8. Chemical composition of interplanted legumes. Average of two years analyses. Dry weight basis.

	Black Medic			Roughpea			Persian Clover		
Fertilizer[1]	Calcium	Phosphorus	Crude protein	Calcium	Phosphorus	Crude Protein	Calcium	Phosphorus	Crude protein
O	1.6	.25	14.7	2.4	.21	22.4	2.5	.14	13.1
N	1.8	.26	17.1	1.8	.33	23.2	2.2	.24	15.2
P	2.6	.22	16.8	1.9	.33	22.6	2.4	.25	14.8
K	3.0	.12	14.7	2.0	.22	21.0	2.5	.13	12.7
NP	2.2	.22	16.4	1.9	.30	22.9	2.4	.30	15.0
PK	2.5	.22	14.2	1.9	.27	21.8	2.6	.27	13.9
PKN	2.5	.23	16.4	1.9	.30	22.8	2.6	.31	14.9
	White clover			Low hop clover			Average legumes		
O	2.2	.19	15.2	2.3	.27	14.3	2.2	.21	15.9
N	2.2	.32	17.7	2.0	.29	16.3	2.0	.29	17.9
P	2.2	.25	18.6	2.3	.30	16.3	2.3	.27	17.8
K	2.5	.26	17.2	2.4	.17	12.8	2.5	.18	15.7
NP	2.4	.24	17.4	2.2	.32	18.5	2.2	.28	18.0
PK	2.2	.28	16.9	2.3	.22	15.9	2.3	.25	16.6
PKN	2.1	.29	18.9	1.9	.30	18.6	2.2	.29	18.3

[1]Footnote 1, Table 3.

Table 9. Phosphorus content of Johnsongrass following interplanted legumes.

Fertilizer[1]	No Legume	Black medic	Roughpea	Persian clover	White clover	Low hop clover	Average all legumes
			Percent on dry weight basis				
			FIRST HARVEST				
O	.23	.25	.24	.15	.21	.21	.21
N	.28	.32	.43	.22	.36	.26	.32
P	.26	.29	.32	.25	.31	.24	.28
K	.19	.21	.18	.16	.21	.19	.19
NP	.29	.27	.39	.26	.38	.29	.34
PK	.31	.30	.38	.21	.38	.28	.32
PKN	.28	.30	.36	.24	.36	.25	.30
			SECOND HARVEST				
O	.15	.13	.14	.13	.15	.15	.14
N	.15	.16	.17	.16	.16	.17	.16
P	.21	.22	.20	.21	.21	.21	.21
K	.19	.17	.18	.17	.19	.19	.18
NP	.18	.20	.20	.21	.19	.19	.20
PK	.18	.18	.17	.19	.18	.20	.18
PKN	.19	.23	.21	.22	.19	.22	.21

[1]Footnote 1, Table 3.

of all the legumes was considered. Low Hop clover increased most. Phosphate and nitrogen alone gave a 14 percent increase, and 29 percent when applied together. The average of the applications of phosphorus to white clover gave 22 percent increase. Overall, application of phosphorus, alone or in combination, increased the crude protein of all the legumes. Potassium resulted in a 4.4 percent increase when the average of all legumes is considered. This was due to the 13 percent increase in white clover; while there was some little reduction with other legumes. This reduction was somewhat offset by the addition of phosphorus to the potash.

The phosphorus content of Johnsongrass following interplanted legumes is given in table 9. It will be seen that the phosphorus content of the Johnsongrass was increased by application of fertilizers both with and without interplanted legumes. The increase was greater fol-

lowing the legumes. The combination of phosphorus and potash gave almost the same increase in phosphorus content as the combination of phosphorus and nitrogen. The phosphorus content of the first harvest was adequate for animal nutrition but was slightly deficient in the second harvest.

The crude protein content of Johnsongrass following interplanted legumes is given in table 10. All fertilizers increased the crude protein content with or without an interplanted legume. There was a greater increase when an interplanted legume was used. Most of the increase resulted from applications of nitrogen, alone or in combination, and a further increase resulted from a combination of a legume and nitrogen. This emphasizes the need for greater applications of nitrogen to Johnsongrass, from both a yield and composition standpoint.

Recommendations

These tests show the value of an interplanted legume in the production of Johnsongrass. Roughpea, white clover, and Persian clover would be recommended on this type of soil. The interplanted legume produces 1 to 1½ tons of legume hay or its equivalent in pasturage which would be in addition to the production of Johnsongrass.

The tests indicate an annual fall application of at least 60 pounds of P_2O_5 per acre. At least 32 pounds of nitrogen should be applied after each cutting of Johnsongrass. The need for higher rates of nitrogen and phosphorus for Johnsongrass is also shown.

Table 10. Crude protein content of Johnsongrass following interplanted legumes.

Fertilizer[1]	No Legume	Black medic	Roughpea	Persian clover	White clover	Low hop clover	Average all legumes
			Percent on dry weight basis				
			FIRST HARVEST				
O	8.4	9.0	12.0	8.1	11.9	11.5	10.7
N	10.5	12.4	13.2	10.0	12.8	13.3	12.3
P	10.0	11.1	12.9	10.0	12.0	10.2	11.2
K	9.3	11.2	11.6	9.6	12.0	11.0	11.2
NP	9.9	12.3	12.5	11.8	12.7	11.6	12.2
PK	9.0	12.2	13.0	11.4	11.8	11.6	12.0
PKN	10.7	12.6	13.5	11.9	12.2	11.9	12.4
			SECOND HARVEST				
O	3.9	4.5	3.9	3.8	3.9	4.1	4.0
N	4.5	4.7	4.7	5.0	4.8	4.5	4.7
P	4.4	4.4	4.1	4.7	5.4	4.8	4.7
K	3.5	4.6	3.9	3.6	4.1	4.6	4.2
NP	3.9	4.9	3.9	4.4	4.9	4.5	4.5
PK	4.2	4.4	3.7	4.1	5.2	4.4	4.4
PKN	4.0	4.1	4.2	4.3	4.4	4.7	4.3

[1]Footnote 1, Table 3.