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COTTON GROWING IN SOUTH MISSISSIPPI

By E. B. Ferris

J. R. RICKS, Director,
Agricultural College, Mississippi.
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Introduction—A great many inquiries are received here and at the main station for information in regard to growing cotton in South Mississippi, and it has been deemed wise to issue a circular giving such information in concise form with which to answer these inquiries.

Our station at Poplarville is located in Pearl River County about fifty miles in an air line from the Gulf Coast and while located at McNeill was approximately fifteen miles nearer this great body of water. We think the records of Weather Bureau will show that locations in this State so near the Coast have a considerably higher rainfall than those farther off and that possibly this excess of rainfall comes more largely in June, July and August, a time when cotton is fruiting best and when frequent showers will cause a lot of shedding, not considering the influence of such showers on the control of the boll weevil. We grew cotton at McNeill for a number of years before the boll weevil appeared and found an average of at least one year out of three years entirely too wet for growing it satisfactorily. With the weevil, cotton growing became so uncertain that for a number of years not a gin was operated in the county and this year, following several years of high priced cotton, only one gin was operated in the county and not one closer than fifteen miles from Poplarville. As a matter of fact, Pearl River County and other counties so near the Coast have done little farming of any kind in the past, being largely composed of forests or uncleared lands left after the timber is removed. Results obtained from growing cotton at McNeill and Poplarville could not, therefore, be applied to the greater part of South Mississippi, without taking the facts as stated above into consideration.

To show what a great part the seasons here play in the production of cotton one has only to compare yields of varieties of cotton obtained at Poplarville in 1918, a dry year ,and in 1919, a wet year. The conditions under which these two crops were made, so far as we were able to make them, were exactly the same, yet in 1918 many varieties tested made approximately a bale to the acre while few in 1919 made so much as 100 pounds of seed cotton to the acre. In neither year was anything done to control the boll weevil except to cultivate often and keep the cotton as nearly as seasons would permit, always in good growing condition. While the rains were not so heavy in 1920 as they were in 1919, they came, as nearly as we could tell, fully as often while the weevils made their appearance earlier in 1920 than they did in 1919. Yet cotton yields here in 1920 compare favorably with those of 1918. We can account for this only from the fact that we tried to catch all the first weevils and later used calcium arsenate to poison them. While located at McNeill we tried catching the first weevils and picking up squares in an effort to grow cotton and found that if the seasons were wet the yields were poor, regardless of the extra effort, so we are forced to believe that the poisoning of weevils this year had much to do with good yields in a wet year. Granting, however, that the poison was responsible for the increased yield over other wet years, it is an expensive operation of doubtful value under present prices of cotton, except on the best lands and used under careful supervision.

Varieties—A study of the following tables ought to give some idea of the varieties best suited to this section. This will vary with the seasons, but we believe under average conditions a variety that matures quickly and largely sheds its foliage will more nearly meet the requirement of the country, but such a variety will frequently be one that in a dry season, when boll weevil infestation is slight, falls far behind others that continue to grow and fruit thruout the growing season. As best we can tell from observation here extending over a number of years, Trice cotton comes nearest of the varieties tried to doing its fruiting early in the season when boll weevil infestation is light, then stops its growth, largely sheds its leaves and allows this fruit to

open. Thus in 1918, a dry year, many varieties out-yielded Trice, but in 1920, a very wet year but more nearly like our average season, Trice led all others, being followed closely by a strain of Cleveland.

Summary of results with varieties of cotton at Poplarville, 1918-'19-'20:

Calculated in Pounds of Seed Cotton per Acre.

Name of Variety	1918	1919	1920
Simpkins	1120	100	1240
			1480
Trice 270-41 (Holly Springs)			1480
Trice	1200		
Trice 270-41 (College)	1220		1280
Dodd's Prolific	940		
Wannamaker Cleveland	1100	93	960
Cleveland Big Boll	1460	75	1060
Cook 1010	1500		1000
Sunbeam	900	31	
Rowden	1300		
Lone Star 15	1220	112	680
Triumph	1220	62	
Lone Star 132	1380	200	
Express 122-433	1780	125	1060
Express 350	1020	112	
Express 432	1240	75	920
Columbia	1100		
Webber 49	1040	78	760
Foster 120	1060	93	1060
Meade	900	48	
Cleveland-37W-54			1280
Cleveland (Smith's)			1320
Mexican Big Boll		156	1100
Miller		31	840
Acala			640
Hartsville			560
Allen's Long Staple		52	
Magnolia (Allen)		100	
Sunflower		87	
Vandiver's Heavy Fruiter		63	
Polk (McWilliams)		87	
Half and Half		61	

Fertilizers—It is a difficult matter to decide positively the best and cheapest fertilizer for cotton, although we have found it to be one of the best crops with which to carry on fertilizer work. A study of the tables that follow will show very contradictory results, especially at Poplarville, where the work has not been carried on sufficiently long to obtain averages from a number of years' results At McNeill the addition of potash to a mixture containing nitrogen and phosphorus gave an average of little or no gain in the yield of cotton, though potash alone usually gave slightly increased yields over no fertilizer. At Poplarville for the short time the work has been going on, potash has seemed more essential. Thus in 1920 the average increase in yield of seed cotton from the addition of phosphorus alone was 324 pounds, from nitrogen alone 287 pounds and from potassium alone, 207 pounds ,but strange to say only in two instances did any combination of the three give any greater, if as large yields, as did the phosphorus alone. A study of all the work done at McNeill and Poplarville leads us to the conclusion that phosphorus is the most essential element in a fertilizer for those soils, that acid phosphate is the best source from which to supply it, and that moderate applications of this acid phosphate with rather small amounts of nitrogen will give best and cheapest results, at least under conditions that presently exist. In most instances we believe as good yields of cotton may be had from 300 pounds of acid phosphate

and 100 pounds of cotton seed meal per acre applied in the drill before planting as from any other combination of fertilizers we may use and that it matters little from what source the nitrogen furnished by the cottonseed meal comes.

Some of our best results have been obtained from the use of acid phosphate alone before planting followed by a top dressing of nitrate of soda after the cotton is up. At the same cost per unit of nitrogen we prefer cottonseed meal as its source because it makes a better mechanical mixture with acid phosphate, becomes more gradually available to plants, and is less likely to be lost by leaching. At present prices cottonseed meal competes in price with other nitrogen carriers, but it is so valuable as a feed for animals that its direct use as a plant food ought to be impossible from an economic standpoint and doubtless will be when business conditions right themselves.

From all results obtained with fertilizers at McNeill and at Poplarville we would conclude that under average conditions raw phosphate or soft phosphate rock neither have any great availability and that regardless of their selling price it does not pay to use them; that basic slag has considerably more availability than the other two, but is still behind acid phosphate in this respect and as the prices of the two are not widely different we see no incentive to use the less available kind.

The two tables following give in brief the results with fertilizers at McNeill and Poplarville on which we base the conclusion above outlined:

The table below gives a summary of eight years work with fertilizers under cotton conducted on permanent plats at McNeill. All this work was done in triplicate and each result for each year is an average of the three separate plats, so selected and so placed as to do away, as largely as possible, with variations in yields due to inequalities of the soil.

FERTILIZER PLAT TESTS WITH COTTON.

Number of plat	Fertilizers calculated in lbs. per acre. Cottonseed Meal	Acid phosphate	Kainit	Ground Phosphate Rock	New Jersey Marl	Raw Ground Bone	Lime and Acid Phosphate mixture (Reverted $P_2 C_5$)	Yield of Seed Cotton per acre 1906	1907	1908	1909	1910	1911-a	1912	1913	Average
1	0	0	0	0	0	0	0	480	220	110	153	20	30	233	43	161
2	100	0	0	0	0	0	0	760	436	376	400	90	63	538	210	359
3	0	100	0	0	0	0	0	800	514	744	480	366	166	846	300	527
4	0	0	100	0	0	0	0	620	300	474	186	34	8	480	120	253
5	100	100	0	0	0	0	0	1060	616	644	513	326	292	744	440	580
6	100	100	100	0	0	0	0	860	640	693	520	306	300	764	496	572
7	200	100	0	0	0	0	0	1040	756	684	620	306	370	922	530	653
8	100	200	0	0	0	0	0	1000	666	636	480	254	340	730	453	570
9	100	0	0	0	500	0	0	620	420		360		140		330	374
10	100	0	0	100	0	0	0	840	510		520		220		447	507
11		0	0	0	0	165	0			720						720
12	100	0	0	0	0	0	400			680		460		860		666
13	100	100	0	land parked by cat				1540	1120	920	624	180	490	1055	450	800
14	100	100	100	tle winter 1902-03				1485	1090	870	633	170	510	1135	390	785

a—All applications of fertilizers doubled in and after 1911.

ville in 1920, this being the second year of the same experiment. The results of 1919 were inconclusive on account of wet weather and the boll weevil.

Number of Plat	Fertilizers calculated in pounds per acre	Yield of seed cotton—Series 1, Calculated in pounds per acre	Increase over check	Yield of seed cotton—Series 2, Calculated in pounds per acre	Increase over check	Average increase over check plats
1	240 lbs. Acid Phosphate	1152	306	1080	342	324
2	Check	594	0	594	0	0
3	60 lbs. Calcium Cyanamid	900	306	882	288	297
4	100 lbs. Nitrate of Soda	954	126	774	198	162
5	Check	828	0	576	0	0
6	240 lbs. Acid Phosphate 60 lbs. Calcium Cyanamid	954	126	792	216	171
7	60 lbs. Calcium Cyanamid 200 lbs. Kainit	1080	252	900	288	270
8	Check	828	0	612	0	0
9	240 lbs. Acid Phosphate 200 lbs. Kainit	1008	180	900	288	234
10	240 lbs. Acid Phosphate 60 lbs. Calcium Cyanamid 200 lbs. Kainit	1096	160	1008	306	233
11	Check	936	0	702	0	0
12	240 lbs. Acid Phosphate 100 lbs. Nitrate of Soda 200 lbs. Kainit	972	36	1152	450	243
13	240 lbs. Basic Slag	882	90	756	90	90
14	Check	792	0	828	0	0
15	Check	846	0	738	0	0
16	240 lbs. Raw Phosphate Rock	612	18	774	36	27
17	200 lbs. Kainit	1026	324	900	90	207
18	Check	702	0	810	0	0
19	240 lbs. Basic Slag 60 lbs. Calcium Cyanamid 200 lbs. Kainit	1008	306	990	80	193
20	240 lbs Raw Phosphate Rock 60 lbs. Calcium Cyanamid 200 lbs. Kainit	1062	126	918	216	171
21	Check	936	0	702	0	0
22	240 Acid Phosphate 200 Kainit 50 lbs. Nitrate of Soda, April 10 50 lbs. Nitrate of Soda, June 1	936	0	990	188	94
23	240 lbs. Acid Phosphate 200 lbs. Kainit 50 lbs Nitrate of Soda, June 1 50 lbs. Nitrate of Soda, July 1	1224	270	612	18	144
24	Check	954	0	594	0	0
25	480 lbs. Acid Phosphate 100 lbs. Nitrate of Soda 200 lbs. Kainit	1278	324	918	324	324
26	240 lbs. Acid Phosphate 200 lbs. Nitrate of Soda 100 lbs. Kainit	1458	504	972	306	405
27	Check	954	0	666	0	0
28	240 lbs. Acid Phosphate 100 lbs. Nitrate of Soda 400 lbs. Kainit	1296	342	1026	360	351

Poisoning Against Boll Weevil—Up to 1920 this station had done no work with trying to control the boll weevil with poison and did not plan any such work at planting time this year. Only such cotton was planted here in 1920 as was proposed to be used in specific tests with varieties, fertilizers, spacing, and rotations and, later, when the earliest and heaviest infestation of weevils we had ever seen appeared, we had no cotton that could be used as a check against that on which poison was used. So, in order to make such experimental work as had been started worth the time required to carry it through we felt compelled to poison all cotton or see the weevil the final limiting factor in all yields. As a matter of fact, all our cotton work was done so closely together that to have left any unpoisoned would probably have affected the real influence of the poison on fields where it was used. Our experiments, therefore with poison lack this much of showing its exact value as compared with yields without the poison. However, the results of a near neighbor whose methods of handling his cotton were much the same as ours and who did not use poison at all were taken as a check against our own and ought to throw some light on the actual effects of the poison on cotton yields. This neighbor had ten acres planted to Bank Account cotton and picked 4,300 pounds of seed cotton from the ten acres. In 1919 he had about the same acreage and made a slightly heavier yield than in 1920. In 1920 our average yield per acre with seventeen varieties of cotton was slightly above 1,000 pounds per acre while in 1919 the average yield from 26 varieties was only ninety pounds of seed cotton per acre. This extremely low yield in 1919 was due in part to the fact that extremely wet weather in May did not permit of cultivating and thinning the cotton at the proper time for in that year we had 11.34 inches of rain with 13 rainy days, whereas in May of 1920 we had 2.92 inches of rain which came on ten rainy days.

In 1920 the weevil appeared here in such large numbers that some farmers who had hoed cotton the first time plowed it up and planted the land to other crops. On the station farm we went over the cotton several times picking weevils by hand. But even with this precaution, in many instances stalks bearing from three to five squares had every one punctured. On June 22 we began the application of calcium arsenate with a hand duster made by the Niagara Sprayer Company, and made three applications to all cotton at intervals of about six days. We were able to poison about an acre an hour with one machine and worked about four hours per day, two hours just after sundown and two hours just after day break. We tried to apply about seven pounds of poison per acre, but at first used much more than this in getting the machine regulated. It was difficult to get labor willing to do the work although we paid 40 cents an hour for it. After three applications, the percentage of infestation was so low that we decided to stop for two weeks on all cotton and at the end of this time, or on July 28 started poisoning again on several fields, but at that time were having such frequent showers that nearly all poison was washed off within twenty four hours after application. While one rain came between June 22 and July 1, it did not fall until after poison had been applied more than twenty four hours. We were never able to find any dead weevil as a result of this poisoning and cannot be sure that the low percentage of infestation after the first of July was due to the poison or to natural causes. This insect works in such dubious ways that we frankly admit we do not understand him, but at any rate after the first of August practically no squares were developed regardless of the poison.

Culture—In speaking of South Mississippi we have reference to the Coastal Plains Region thereof, and not to other soil types that compose a part of this territory. As a rule these Coastal Plains soils are sandy-loams easily prepared and cultivated and from a physical standpoint among the most desirable soils in the state. As a rule they lack organic matter and also phosphorus and nitrogen. Every effort should be made to increase their natural supply of organic matter by growing crops in rotation with cotton that will have this effect. We have found none that accomplish this end more quickly than corn and velvet beans under a two-year three-crop system. A rotation of cotton, corn and cowpeas and oats followed by cowpeas under a three-year five-crop system is also very effective as was conclusively shown by careful experiments carried on for a number of years at McNeill. We also tried at McNeill a method of growing cotton every year with vetch in the

winter and early spring, but found this too expensive on account of the fact that the vetch did not reseed well and, too, occupied the ground so late in the spring that the cotton got a late start and would produce nothing under boll weevil conditions. We believe this reseeding of the vetch might be improved by liming the land, so have started at Poplarville an experiment of growing it with cotton and corn in rotation on land well limed. Under the same conditions we are also using bur clover with the hope that it may be even better than vetch.

Under a system of well conducted rotations, we believe acid phosphate alone applied in the drill before planting at the rate of from 200 to 400 pounds per acre, followed after the cotton is up and thinned by a top dressing of nitrate of soda at the rate of 50 to 100 pounds per acre will give the cheapest yields of cotton so far as fertilizers are concerned. Rows placed three and one-half feet apart are very satisfactory and we prefer to put the acid phosphate in the drill and bed upon it some days in advance of planting so as to give a firm seed bed in which the seed will germinate quickly when planted. On the naturally well drained soils of the section these beds should be dragged down to where the top is only slightly elevated above the average of the field. A Ledbetter one-seed planter so set as to drop the seed as close together as possible will give a stand easily thinned and at same time require much fewer seed than the old fashioned planters. The concensus of opinion seems to be that close spacing in the drill gives larger yields than wider spacing, but a hoe's width apart is about as close as it can be cleaned satisfactorily. Experiments here this year on spacing were favorable to the close spacing, hoe's width, or nine inches, giving 1,216 pounds per acre, fifteen inches 1,108 pounds, and 24 inches 1,010 of seed cotton per acre respectively.