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STUDY OF THE WEEDS OF ALFALFA FIELDS OF IOWA

A. L. HERSHEY AND L. H. PAMMEL

During the past few years a study has been made of the weeds occurring in the alfalfa fields of Iowa, and of their effect upon crop production. The work reported here was done in the summers of 1928 and 1929.

Data was obtained by taking readings in fifteen fields before the first crop was harvested, and again previous to the second cutting. From three to six readings were made in each field. A reading consisted in counting the kinds and number of various plants found in an area three by three feet. These areas were selected at random in various parts of the fields. The work included the study of fields in thirteen different countries of the state.

The first readings were made in June, previous to the harvesting of the first crop. At this time the following weeds were predominant: blue grass (*Poa pratensis*), dandelion, (*Taraxacum officinale*), shepherd's purse (*Capsella Bursa-pastoris*), wild lettuce (*Lactuca scariola*), *Hordeum jubatum*, *Erigeron canadensis*, *Oxalis corniculata*, *Lepidium apetalum*, *Erigeron annuus*, sour dock (*Rumex crispus*) bind weed (*Polygonum convolvulus*), etc. Foxtails (*Setaria viridis* and *S. glauca*) and small ragweed (*Ambrosia artemisiifolia*), are very numerous in a large percentage of the fields, but are in the seedling stage. They form an undergrowth about an inch in height and are very dense in some plots.

It is of interest to note the presence of two weeds that were reported in a few fields, goat's beard (*Trogapogon partensis*), and the winter annual awned brome grass (*Bromus tectorum*), and some quack grass (*Agropyron repens*) in northern Iowa.

The second readings were taken late in July or early in August before the second crop was harvested. At this time the foxtails (*Setaria viridis* and *S. glauca*) and the small ragweed (*Ambrosia artemisiifolia*), are without doubt, the predominating weeds of the alfalfa fields. The foxtails were reported from all fields studied, and the ragweed was reported from fifty per cent of the fields. Other common weeds were: dandelion, morning glory (*Convolvulus sepium*), *Erigeon annuus*, *Lactuca scariola*, milk-

Weeds in Alfalfa Fields of Iowa According to Frequency of Occurrence

WEEDS	RANK			
	FIRST CUTTING	% FIELD IN WHICH WEED OCCURS	SECOND CUTTING	% FIELD IN WHICH WEED OCCURS
<i>Setaria viridis</i> and <i>S. glauca</i>	1	73	1	100
<i>Poa pratensis</i>	2	60	9	20
<i>Taraxacum officinale</i>	3	65	2	65
<i>Capsella Bursa-pastoris</i>	4	50	0	
<i>Lactuca scariola</i>	5	80	6	20
<i>Ambrosia artemisiifolia</i>	6	60	3	40
<i>Hordeum jubatum</i>	7	80	17	20
<i>Erigeron canadensis</i>	8	60	16	25
<i>Oxalis corniculata</i>	9	53	11	20
<i>Lepidium apetalum</i>	10	40	0	
<i>Erigeron annuus</i>	11	40	5	50
<i>Rumex crispus</i>	12	60	15	15
<i>Polygonum Convolvulus</i>	13	30	19	35
<i>Potentilla monspeliensis</i>	14	20	20	15
<i>Thlaspi arvense</i>	15	20	0	
<i>Phleum pratense</i>	16	40	0	
<i>Chenopodium album</i>	17	20	10	60
<i>Polygonum Persicaria</i>	18	20	13	15
<i>Tragopogon pratensis</i>	19	15	0	
<i>Asclepias syriaca</i>	20	12	7	40
<i>Bromus tectorum</i>	21	*	18	
<i>Plantago Rugelii</i>	22	*	8	
<i>Convolvulus sepium</i>	23	*	4	
<i>Agropyron repens</i>	24	*	14	
<i>Brassica juncea</i>	25	*	30	
<i>Helianthus annuus</i>	26	*	32	
<i>Ambrosia trifida</i>	27	*	29	
<i>Viola</i>	28	*	33	
<i>Avena sativa</i>	29	*	0	
<i>Equisetum arvense</i>	30	*	24	
<i>Secale cereale</i>	31	*	0	
<i>Solanum nigrum</i>	32	*	12	
<i>Solanum carolinense</i>	0	*	21	
<i>Sonchus oleraceus</i>	0	*	22	

* Present in one field.

Weeds Occurring Infrequently

FIRST CUTTING	SECOND CUTTING
<i>Sisymbrium officinale</i>	<i>Achille lamulosa</i>
<i>Acalypha virginica</i>	<i>Acalypha virginica</i>
<i>Bidens frondosa</i>	<i>Amaranthus retroflexus</i>
<i>Lychnis alba</i>	<i>Ambrosia trifida</i>
<i>Oxybaphus nyctagineus</i>	<i>Cirsium arvense</i>
<i>Pastinaca sativa</i>	<i>Lychnis alba</i>
<i>Verbena bracteosa</i>	<i>Arctium minus</i>
<i>Verbascum Thapsus</i>	<i>Bidens frondosa</i>
<i>Xanthium commune</i>	<i>Digitaria sanguinalis</i>
<i>Zizia aurea</i>	<i>Euphorbia prestlii</i>
	<i>Muhlenbergia Schreberi</i>
	<i>Phleum pratense</i>
	<i>Physalis pubescens</i>
	<i>Saponaria Vaccaria</i>
	<i>Verbena bracteosa</i>

* Present in one field.

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FIELDS STUDIED

<i>First cutting</i>		% OF ALFALFA FIRST CUTTING	% OF ALFALFA SECOND CUTTING	
1. Boone county	Jordan, Iowa	63	37	Webster loam
2. Boone county	Jordan, Iowa	75	25	Webster loam
3. Boone county	Jordan, Iowa	83	17	Webster loam
4. Calhoun county	Manson, Iowa	61	39	Webster loam
5. Pocahontas county	Rolfe, Iowa	50	50	Webster loam
6. Polk county	Ankeny, Iowa	45	55	Webster clay loam
7. Polk county	Ankeny, Iowa	34	66	Webster clay loam
8. Story county	Ames, Iowa	41	49	Carrington loam
9. Story county	Ames, Iowa	83	17	Carrington loam
10. Story county	Story City, Iowa	81	19	Carrington loam
11. Story county	Ames, Iowa	75	25	Wabash silt loam
12. Webster county	Lehigh, Iowa	93	7	Wabash silt loam
13. Webster county	Lehigh, Iowa	38	62	Wabash silt loam
14. Webster county	Fort Dodge, Iowa	39	61	Wabash silt loam
		62%	38%	
<i>Second cutting</i>				
1. Boone county	Jordan, Iowa	76	24	Webster loam
2. Greene county	Dana, Iowa	85	15	Carrington loam
3. Greene county	Grand Junction, Iowa	62	38	Carrington loam
4. Hamilton county	Webster City, Iowa	75	25	Carrington loam
5. Hamilton county	Webster City, Iowa	78	22	Carrington loam
6. Montgomery county	Red Oak, Iowa	72	28	Marshall silt loam
7. Montgomery county	Red Oak, Iowa	69	31	Wabash silt loam
8. Page county	Essex, Iowa	31	60	Wabash silt loam
9. Story county	Ames, Iowa	82	19	Carrington silt loam
10. Story county	Ames, Iowa	77	23	Wabash, silt loam
11. Tama county	Green Mountain, Iowa	21	79	Wabash silt loam
12. Tama county	Gladbrook, Iowa	76	24	Tama silt loam
13. Webster county	Fort Dodge, Iowa	68	32	Webster loam
14. Webster county	Fort Dodge, Iowa	34	66	Webster loam
		65%	35%	

First Cutting

	BOONE	CALHOUN	CHEROKEE	GREENE	HAMILTON	HANCOCK	MONTGOMERY	PAGE	POLK	STORY	TAMA	WEBSTER
<i>Acalypha virginica</i>	1.0											
<i>Anthemis Cotula</i>												
<i>Agropyron repens</i>		39.0				7.0						
<i>Achillea lanulosa</i>												
<i>Ambrosia artemisiifolia</i>	13.0					10.0		52.0		0.3		8.0
<i>Amaranthus retroflexus</i>												
<i>Ambrosia trifida</i> L.						3.0			0.8	0.3		
<i>Arctium minus</i>									0.1			
<i>Asclepias syriaca</i>												
<i>Avena sativa</i>										0.8		
<i>Bidens frondosa</i>	0.3	0.8				16.0						
<i>Brassica juncea</i>	0.5											
<i>Bromus tectorum</i>										3.0		
<i>Capsella Bursa-pastoris</i>	.4								8.0	9.0		7.0
<i>Chenopodium album</i>	3.0					0.6				0.5		
<i>Cirsium arvense</i>						7.0						
<i>Convolvulus sepium</i>										0.5		0.2
<i>Digitaria sanguinalis</i>												
<i>Equisetum arvense</i>										0.3		
<i>Echinochloa crus-galli</i>						4.0						
<i>Erigeron annuus</i>	0.2					3.0		0.4		3.0		
<i>Erigeron canadensis</i>	3.0							0.1	10.0	3.5		1.3
<i>Euphorbia Prestlii</i>												
<i>Helianthus annuus</i>	0.3									0.2		1.1
<i>Hordeum jubatum</i>		2.0				7.0			0.5	7.0		
<i>Lactuca scariola</i>	5.4				1.0				0.3	1.5		
<i>Lepidium apetalum</i>	0.1	4.7						0.5		2.4		
<i>Lycnis alba</i>												
<i>Muhlenbergia Schreberi</i>												
<i>Oxalis corniculata</i>	4.0								5.5	24.0		
<i>Oxybaphus nyctagineus</i>	.2											
<i>Pastinaca sativa</i>												
<i>Phleum pratense</i>	0.5				14.0				0.7	0.3		

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First Cutting -- (Continued)

	BOONE	CALHOUN	CHEROKEE	GREENE	HAMILTON	HANCOCK	MONTGOMERY	PAGE	POLK	STORY	TAMA	WEBSTER
<i>Physalis pubescens</i>										1.0		
<i>Plantago Rugelii</i>										26.0		
<i>Poa pratensis</i>	14.5	2.0			14.0				13.0	26.0		
<i>Polygonum Convolvulus</i>		6.0			5.0					2.6		
<i>Polygonum Persicaria</i>	2.1											
<i>Portulaca oleracea</i>												
<i>Potentilla monspeliensis</i>	03								1.0	3.0		
<i>Rumex crispus</i>	0.1	0.2								2.5		
<i>Saponaria Vaccaria</i>												
<i>Secale cereale</i>	0.5											
<i>Setaria glauca</i>												
<i>Setaria viridis</i>	45.0	39.0			14.0		39.0		t	15.0		
<i>Sisymbrium officinale</i>	.4									7.0		
<i>Solanum carolinense</i>												
<i>Solanum nigrum</i>										0.4		
<i>Solidago canadensis</i>												
<i>Sonchus oleraceus</i>												
<i>Taraxacum officinale</i>	1.7	6.3							0.7	1.5		
<i>Thlaspi arvense</i>									4.1	2.3		
<i>Fagopyrum esculentum</i>												
<i>Tragopogon pratensis</i>										2.5		6.0
<i>Trifolium (all)</i>	3.6	0.2					1.5		1.0	2.0		t*
<i>Verbascum Thapsus</i>												
<i>Verbena stricta</i>							0.3					
<i>Verbena bracteosa</i>												
<i>Viola</i>												
<i>Xanthium commune</i>												0.1
<i>Zizia aurea</i>							0.1					

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Second Cutting

	BOONE	CALHOUN	CHEROKEE	GREENE	HAMILTON	HANCOCK	MONTGOMERY	PAGE	POLK	STORY	TAMA	WEBSTER
<i>Agropyron repens</i>							0.5	1.0			6.0	
<i>Achillea lanulosa</i>							0.1	1.0				
<i>Ambrosia artemisiifolia</i>	15.0		10.0				3.0				18.0	
<i>Amaranthus retroflexus</i>								4.0				2.5
<i>Ambrosia trifida</i> L.												
<i>Arctium minus</i>				0.9								
<i>Asclepias syriaca</i>	1.3			1.0	0.2		0.8	0.3			0.5	
<i>Avena sativa</i>											0.5	
<i>Bidens frondosa</i>												
<i>Brassica juncea</i>					0.2							
<i>Bromus tectorum</i>					0.3							1.0
<i>Capsella Bursa-pastoris</i>												
<i>Chenopodium album</i>	3.0			2.0	1.5		0.5	1.3		1.0		1.0
<i>Cirsium arvense</i>								0.7				
<i>Convolvulus sepium</i>				2.0	0.8		1.5					
<i>Digitaria sanguinalis</i>							1.8					
<i>Equisetum arvense</i>											18.0	
<i>Echinochloa crus-galli</i>			11.0	16.00			4.0					
<i>Erigeron annuus</i>								2.5				6.0
<i>Erigeron canadensis</i>	7.0		4.0	1.0	0.5					1.3	1.0	
<i>Euphorbia Preslii</i>			4.0									
<i>Helianthus annuus</i>								1.5				
<i>Hordeum jubatum</i>								0.5				3.0
<i>Lactuca scariola</i>	4.0									1.3	1.0	
<i>Lepidum apetalum</i>												
<i>Lychnis alba</i>								2.0				
<i>Muhlenbergia Schreberi</i>				2.0								
<i>Oxalis corniculata</i>	3.0			2.0						11.0	1.8	
<i>Oxybaphus nycitagineus</i>												
<i>Pastinaca sativa</i>												
<i>Pheum pratense</i>												
<i>Physalis pubescens</i>											0.4	
<i>Plantago Rugelii</i>						0.5	0.3	4.0				11.0

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Second Cutting — (Continued)

	BOONE	CALHOUN	CHEROKEE	GREENE	HAMILTON	HANCOCK	MONTGOMERY	PAGE	POLK	STORY	TAMA	WEBSTER
<i>Poa pratensis</i>	12.0									0.2		
<i>Polygonum Convolvulus</i>	5.0						2.3	0.2		1.0	2.0	3.0
<i>Polygonum Persicaria</i>	11.0									4.0		
<i>Portulaca oleracea</i>								3.0				
<i>Potentilla monspeliensis</i>											0.2	
<i>Rumex crispus</i>											0.4	
<i>Saponaria Vaccaria</i>							1.7					
<i>Secale cereale</i>												
<i>Setaria glauca</i>	10.0		22.0	27.0				9.0		1.5	11.0	3.0
<i>Setaria viridis</i>	20.0		36.0	18.0	6.0		1.1	11.0		22.5	21.0	8.0
<i>Sisymbrium officinale</i>												
<i>Solanum carolinense</i>					0.8			2.0		0.5		
<i>Solanum nigrum</i>	0.9							2.2		5.0		
<i>Solidago canadensis</i>										1.0		
<i>Sonchus oleraceus</i>										2.0	2.0	
<i>Taraxicum officinale</i>	3.6			26.0	2.3					1.1	0.5	
<i>Thlaspi arvense</i>										1.2		
<i>Fagopyrum esculentum</i>				1.5	0.3			0.3				
<i>Tragopogon pratensis</i>												
<i>Trifolium (all)</i>	6.0			1.0	0.5		0.8	1.5			7.5	
<i>Verbascum Thapsus</i>							0.2					9.0
<i>Verbena stricta</i>	0.5		8.0									
<i>Verbena bracteosa</i>			4.0									
<i>Viola</i>					0.1							
<i>Xanthium commune</i>											0.7	0.7
<i>Zizia aurea</i>												

WEEDS OF ALFALFA FIELDS OF IOWA

weed (*Asclepias syriaca*), *Plantago Rugelii*, *Poa pratensis* *Chenopodium album*, *Solanum nigrum*, quack grass (*Agropyron repens*), etc.

A comparison between the per cent of alfalfa plants and number of weeds in the fields is of interest. In old fields the number of alfalfa plants is often less than thirty per cent of the total vegetation present. An average for fourteen fields previous to the first cutting was sixty-two per cent alfalfa and thirty-eight per cent weeds. Before the second cutting the alfalfa equalled sixty-five per cent of the total plants in the plots studied. In certain fields in which blue grass or quack grass had gained a foothold, the crop was usually ruined by the killing of large areas of the alfalfa. Although these grasses are not as common as other-plants reported, they are probably more destructive than are the other weeds.

We have checked these with the soil survey reports, Iowa Agricultural Experiment Station and the United States Department of Agriculture.

SUMMARY:

The predominating weeds are:

Before the first cutting:

Common foxtail (*Setaria viridis*), yellow foxtail (*S. glauca*), sour dock (*Rumex crispus*), in some fields squirrel tail grass (*Hordeum jubatum*), *Agropyron repens*, blue grass (*Poa pratensis*), and occasionally goat's beard (*Tragopogan pratensis*).

Just previous to second cutting:

Foxtails (*S. viridis* and *S. glauca*), barnyard grass (*Echinochloa crusgalli*), small rag weed (*Ambrosia artemisiifolia*), blue grass (*Poa pratensis*), Heart's-ease (*Polygonum pennsylvanicum*) smart weed (*P. Persicaria*), occasionally goat's beard (*Tragopogan pratensis*), and quack grass.

It is to be noted that the small rag weed was particularly common before the second cutting.

Just previous to third cutting:

The predominating weeds were small rag weed, foxtails, barnyard grass, heart's ease and sour dock.

The types of weed vary somewhat with different soils. The weed types of western Iowa are somewhat different than those of central and eastern Iowa. The *Gaura coccinea* is particularly com-

mon in western Iowa, and considerable quantities of the whorled millet or bristly foxtail are also found in some fields.

We are indebted to Miss Thelma Hawkins for data on weed study of the college campus and Montgomery county.