

A SURVEY OF TOWNSVILLE STYLO (TOWNSVILLE LUCERNE) PASTURES ESTABLISHED IN THE NORTHERN TERRITORY UP TO 1969

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ABSTRACT

There were an estimated 128,000 acres of Townsville stylo (Stylosanthes humilis formerly Townsville lucerne) pastures in the N.T. of Australia in 1969. 34,300 acres of this were sown during the 1967-1968 wet season, and 28,000 during 1968-1969. Aerial spreading and grass control by burning and grazing was the most favoured establishment method. 40% of the seed sown in 1967-1968 was purchased and machine dressed. 2,800 and 2,600 tons of superphosphate were applied to these pastures in 1967-1968 and 1968-1969, respectively.

INTRODUCTION

There has been a rapid expansion of the area of pastures of the annual legume Townsville stylo (*Stylosanthes humilis*) in the Northern Territory since 1966. But information on the area and distribution of these pastures, the methods used in their establishment, the pattern of seed and superphosphate use, and their productivity, has been scattered and incomplete. An attempt has been made in this paper to bring this information together and summarize it.

METHOD

The information of a number of officers of the Animal Industry and Agriculture Branch, who had contact with various sections of the grazing and farming community in the northern part of the N.T., was pooled in 1967. This included information on areas of Townsville stylo on individual properties and the time and method of sowing of each.

In October 1968, a questionnaire was sent out to 225 holders of pastoral leases, agricultural leases, missions and settlements, and experiment farms, in the Darwin and Gulf, Victoria River and Barkly Tableland districts. This included questions on the total area of Townsville stylo on each property, the 1967-1968, sowings 1968 seed and hay yields, and intended sowings and top dressings during 1968-1969 and 1969-1970. 57% of these questionnaires were returned. Replies were received from 74% of the properties known to have Townsville stylo, and Branch officers were able to provide information on the areas of pasture and new sowings on the other 26%, which did not appear to be an atypical group.

RESULTS

Total area and distribution

There were a total of 128,000 acres of Townsville stylo pastures in the N.T. in 1969 (Table 1). This represented an increase of 360% from 1964 to 1969. In 1969, 65% of these pastures were on pastoral leases, 24% on agricultural leases and freehold, 4% on missions and settlements, and 7% on government properties such as experiment farms. Several pastoral leases, the missions and settlements and experiment farms had substantial areas of Townsville stylo pasture prior to 1964. But, during 1964-1969 the greatest increase was on pastoral leases followed by agricultural leases.

On pastoral leases, the greatest area in 1969 and the greatest increase in area from 1964 to 1969 were on those owned by overseas interests (Table 2). This may have been a reflection of the larger capital resources and more progressive nature of some of the overseas owners. Owner-operated pastoral leases had the smallest area in 1969 and the smallest increase between 1964 and 1969.

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TABLE 1.
Acreege of Townsville stylo in the N.T.

Year	On Pastoral leases		On Agricultural leases		Missions and Settlements		Other		Total	
	No.	Ac	No.	Ac	No.	Ac	No.	Ac	No.	Ac
1964	24	27062*	22	3272	14	1822	9	4762	69	36918
1965	25	27964	27	5424	14	2072	10	5776	76	41236
1966	26	28792	28	10954	14	2312	10	6026	78	48084
1967	33	38505	36	18564	14	2482	11	6791	94	66342
1968	47	63502	64	26379	14	2877	11	7920	136	100678
1969 (est.)	48	84511	65	29959	14	4957	11	9110	138	128537

*Approximately 22,000 acres were on two stations as a result of hand spreading of seed and hay beginning in 1914-15.

TABLE 2.
Acreege of Townsville stylo on N.T. pastoral leases.

Year	Owner operated		Absentee Owner			
	No.	Ac	Australian		Overseas	
	No.	Ac	No.	Ac	No.	Ac
1964	7	2351	9	17245	9	7466
1965	7	2461	9	17245	10	8258
1966	7	2461	9	17815	11	8516
1967	8	2611	12	19035	14	16859
1968	15	6794	17	26089	15	30619
1969 (est.)	15	6899	17	28943	16	48669
1970 (est.)	15	7902	18	44343	16	70669

TABLE 3.
Areas of N.T. properties covered by survey.

	Pastoral Leases						Total
	Owner operated	Absentee Australian owners	Absentee overseas owners	Agricultural leases	Missions and Settlements	Other	
Area of properties covered by survey (sq. miles)	44092	60897	65293	325	3009	65	173681
Area of properties with Townsville stylo pasture in 1968 (sq. miles)	15030	21627	26321	239	1881	65	65163
Proportion of Townsville stylo pasture in 1968 on properties with such pasture.	0.07%	0.19%	0.18%	17.2%	0.24%	21.7%	0.31%

Note: The N.T. covers 520,280 sq. miles. In 1968, there were 498 sq. miles of freehold land, 281,662 sq. miles of leasehold, 17,705 sq. miles held under licence, 95,294 sq. miles of reserves, and 125,120 sq. miles unoccupied and unreserved. Of the leasehold land, there were 272,694 sq. miles of pastoral leases, 202 sq. miles of agricultural leases, 2,164 sq. miles of mission leases, 1,526 sq. miles of special purpose leases, 5,027 sq. miles of homestead leases, and 5,850 sq. miles of special purpose leases, 5,027 sq. miles of homestead leases, and 5,850 sq. miles of occupation development licences. For the purposes of the survey, the homestead leases and the O.D.L.'s were included with the pastoral leases; and some freehold, special purpose leases, and licences were included with the agricultural leases.

0.31% of the area of the properties carrying Townsville stylo was actually under this pasture in 1968 (Table 3). Only agricultural leases and experiment farms had Townsville stylo on substantial proportions of their area. On pastoral leases, those which were owner operated had the lowest proportion of Townsville stylo, and those with absentee owners the highest.

The distribution of Townsville stylo in the N.T. in 1968 is shown in Figure 1. Most was within 100 miles of Darwin, or around Katherine.

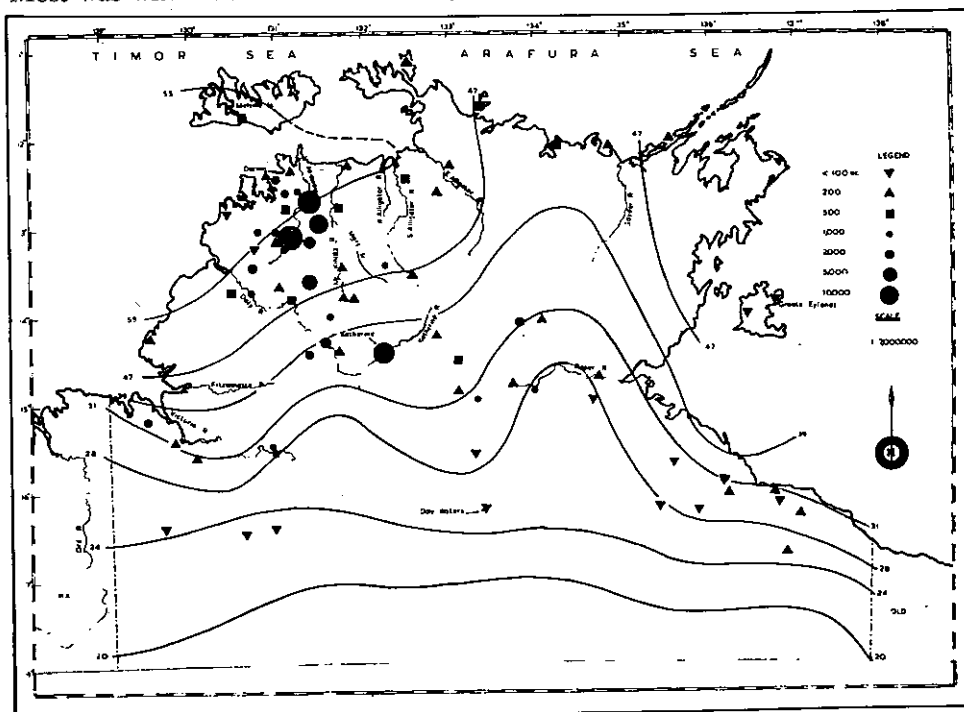


FIGURE 1
The distribution of Townsville stylo pastures in the Northern Territory in 1968

Sowing

As shown in Table 4, there was a rapid increase in the total area of pasture sown in 1966-1967 compared with previous seasons, and the sowings, actual and intended, increased further during the next three seasons. Sowings on agricultural leases and government properties remained relatively constant. Missions and settlements intended to increase their sowings during 1968-1969 and 1969-1970.

TABLE 4.
New Sowings of Townsville stylo in the N.T.

Season	Pastoral Leases		Agricultural Leases		Missions and Settlements		Other		Total	
	No.	Ac sown	No.	Ac sown	No.	Ac sown	No.	Ac sown	No.	Ac sown
1964-5	5	902	8	2152	3	250	2	1014	18	4318
1965-6	6	828	12	5530	5	240	2	250	25	6848
1966-7	21	9713	24	7610	3	170	4	765	52	18258
1967-8	27	24997	38	7815	6	395	6	1129	77	34336
1968-9*	22	21009	32	3580	7	2080	5	1190	66	27859
1969-70*	16	38403	19	2126	4	1780	5	1175	44	43484

*Intended sowings.

Pastoral leases were responsible for most of the increase in annual sowings; their sowings increased from 900 acres in 1964-1965 to an intended 38,000 in 1969-1970. On each of two pastoral leases it was intended to sow 10,000 acres in 1969-1970. Pastoral leases owned by overseas interests usually sowed larger areas of Townsville stylo each year than those with absentee Australian owners (Table 5), while the owner operated pastoral leases sowed the smallest areas each year.

TABLE 5.
Breakdown of Sowings of Townsville stylo on N.T. pastoral leases.

Year	Owner operated		Absentee Owner			
	No.	Ac	Australian		Overseas	
	No.	Ac	No.	Ac	No.	Ac
1964-65	1	110	0	0	4	792
1965-66	0	0	2	570	4	258
1966-67	2	150	8	1220	11	8343
1967-68	7	4185	10	7054	10	13760
1968-69*	5	105	8	2854	9	18050
1969-70*	2	1003	6	15400	8	22000

*Intended sowings.

TABLE 6.
Sowing methods used during 1966-67.

Primary method of grass control, and land preparation	Method of spreading seed and superphosphate					
	Broadcast		Drill		Air	
	No. sowings	Ac	No. sowings	Ac	No. sowings	Ac
No grass control:						
land cleared	0	0	0	0	0	0
not cleared	2	200	4	370	0	0
Cultivation:						
land cleared	2	345	22	2590	3	788
not cleared	0	0	4	1665	2	400
Burning:						
land cleared	0	0	0	0	1	130
not cleared	0	0	0	0	6	5470
Stocking:						
land cleared	0	0	0	0	0	0
not cleared	0	0	0	0	5	4950
Total	4	545	30	4625	17	11738

A further 12 sowings totalling 1350 acres could not be classified.

TABLE 7.
Sowing method used during 1967-68

Grass control by:			Method of spreading seed and fertilizer					
Cultivation	Burning	Grazing	Broadcast		Drill		Air	
			No. of properties	Ac sown	No. of properties	Ac sown	No. of properties	Ac sown
+	+	+	0	0	2	160	1	250
+	+	—	0	0	2	270	0	0
+	—	+	13	711	4	1640	4	2060
+	—	—	10	796	13	1899	4	1070
—	+	+	3	6100	0	0	10	11760
—	—	+	2	410	0	0	0	0
—	+	—	1	200	0	0	2	3530
—	—	—	0	0	0	0	1	1000
Total			29	8217	21	3969	22	19670

A further 6 sowings totalling 2480 acres could not be classified.

The sowing methods used in 1966-1967 are analysed in Table 6, and those used in 1967-1968 in Table 7.

Aerial spreading of seed and fertilizer was the preferred method of distribution in both seasons, covering 64% of the sown area in 1966-1967 and 58% in 1967-1968. This indicated a rapid acceptance of aircraft, as these were first used in the N.T. in 1965-1966 for spreading Townsville stylo seed and superphosphate over 770 acres, or 11% of the total area sown that season.

Grass control by burning and/or grazing was preferred to cultivation on larger areas. In 1966-1967 there was grass control by cultivation on 32% of the area sown and grass control by burning or grazing on 58%. In 1967-1968 there was grass

control by cultivation on 26% of the area sown and by burning and/or grazing on 65%. Cultivation and clearing were favoured in the sowing of a large number of small areas on agricultural leases and government controlled land, while grass control by burning and grazing without clearing was favoured in the sowing of a small number of large areas on pastoral leases.

57% of the Townsville stylo seed used in 1967-1968 was machine dressed (Table 8), but only 8% was certified. Purchased seed was usually machine-dressed, but home grown seed was usually used without cleaning.

TABLE 8.
Source and treatment of seed used in 1967-68.

	Used without cleaning	Seed treatment		Machine dressed and certified
		Machine dressed	Water washed	
Acres sown with:				
Home grown seed	4,575	2,260	40	289
Purchased seed	9,300	12,280	120	2,038
Total quantity used (lb):				
Home grown seed	34,042	15,601	950	1,890
Purchased seed	36,600	69,402	1,590	11,374
Proportion used (% of total):				
Home grown seed	20	9	1	1
Purchased seed	21	40	1	7
Number of properties using:				
Home grown seed	13	7	2	3
Purchased seed	10	14	2	11

There was no information available for a further 3434 acres on 16 properties.

TABLE 9.
Seed use.

	1967-68				1968-69 (Estimated)			
	No. of properties	Acres	Seed used lb	Seed used lb/ac	No. of properties	Acres	Seed used lb	Seed used lb/ac
New sowings	62	30,906*	171,467	5.55	50	26,176†	147,578	5.64
Resowings	0	0	0	0	4	1,640	9,130	5.56
Total			171,467				156,708	

*There was no information on seeding rate for a further 3430 acres sown on 16 properties.
†There was no information on seeding rate for a further 1683 acres sown on 16 properties.

TABLE 10.
Rates of seed and superphosphate used in 1967-68 sowings (ac at each rate).

Rate of seeding (lb/ac)	Rate of superphosphate (lb/ac)				
	0	1-100	101-200	201-300	Total
1	0	15	0	0	15
2	100	0	2,000	0	2,100
3	8	4,000	200	0	4,208
4	1,000	3,000	1,000	4	5,004
5	400	400	5,290	980	7,070
6	0	0	3,455	0	3,455
7	0	210	1,000	0	1,210
8	0	2,000	190	4,300	6,490
>8	120	88	937	159	1,304
Total	1,628	9,713	14,072	5,443	30,856

A further 3,480 acres could not be classified.

The average seeding rate for new sowings was 5.55 lb of pods per acre in 1967-1968, and 5.64 per acre in 1968-1969 (Table 9). 76 tons of seed were used for new sowings in 1967-1968, and the intended usage in 1968-1969 was 70 tons for

new sowings and resowings. The use of different rates of seed and superphosphate in 1967-1968 is analysed in Table 10. 28% of the area sown was sown at the recommended rates of 5 to 6 lb of seed and 1 cwt of superphosphate.

Superphosphate use

N.T. superphosphate costs and total sales are given in Table 11 for each season since 1963-1964. Only bagged 22% superphosphate was available prior to 1966-1967. In that year, 2,400 tons of bulk 22% superphosphate, 550 tons of bagged 22% superphosphate, and 50 tons of bagged 44% superphosphate were brought to the N.T. A subsidy was introduced in 1966-1967 to reduce the Darwin superphosphate price to that at Townsville. Further bulk shipments were delivered in 1967-1968, and in 1968-1969. In 1968-1969 all except a few tons of the bagged 22% superphosphate used in the N.T. were bagged in Darwin.

TABLE 11.
Total N.T. Superphosphate use.

Season	Subsidy to Primary Producers to give parity with Townsville price (\$ per ton)			Cost to Primary Producers (\$ per ton ex-store Darwin)			Cost of aerial distribution (\$ per ton) without surcharges	Total N.T. sales (tons)			
	Bulk 22%	Bagged 22%	Bagged 44%	Bulk 22%	Bagged 22%	Bagged 44%		Bulk 22%	Bagged 22%	Bagged 44%	Total (as 22%)
1963-64	—	0	—	—	46.30	—	—	0	258	0	258
1964-65	—	0	—	—	48.70	—	—	0	775	0	775
1965-66	—	0	—	—	51.00	—	12.00	0	1000	0	1000
1966-67	7.00	13.20	24.70	34.00	38.80	77.30	10.00	1199	551	53	1856
1967-68	8.00	12.20	15.65	35.00	39.80	80.35	12.00	3974	1721	69	5653
1968-69	11.20	14.60	18.20	34.80	40.40	73.40	12.00	2015	971	21	3028

There was a very rapid expansion in superphosphate usage up to 1967-1968. 2,660 tons of superphosphate were used on grain sorghum in 1967-1968, but much of the 1968-1969 sorghum crop was fertilized with an NPK mixture.

TABLE 12.
Superphosphate use on Northern Territory Townsville stylo pastures.

Season	Pastoral leases		Agric. leases		Missions and Settlements		Other		Total	
	No.	Tons	No.	Tons	No.	Tons	No.	Tons	No.	Tons
1964-65	9	76	22	196	0	0	3	91	34	363
1965-66	11	95	32	176	0	0	4	96	47	367
1966-67	27	622	48	779	9	36	6	314	90	1751
1967-68	18	1569	28	787	9	9	6	437	61	2802
1968-69	22	1473	30	675	9	25	7	417	68	2590
1968-69*	14	1321	34	864	9	103	6	258	63	2547
1969-70*	13	2510	25	913	6	98	5	330	49	3851

This includes information kindly supplied by A.C.F. and Shirleys, Cresco, and the Commonwealth Bureau of Census and Statistics.

*Intended use.

The use of superphosphate on Townsville stylo pastures is analysed in Table 12. The figures for 1964-1966 were supplied by the Bureau of Census and Statistics. The figures for 1966-1969 were compiled from information supplied by A.C.F. and Shirleys Limited and by Cresco Fertilizers Limited. Intended usages obtained from the 1968 survey were also included. The amount of superphosphate used on pastures by the missions and settlements in 1967-1969 was estimated at half their total purchases.

The Northern Territory Administration conducted a series of concessional superphosphate demonstrations on Townsville stylo pastures during 1965-1967. In 1966-1967, 482 tons were distributed to 23 pastoral leases, 48 agricultural leases and 9 missions. These amounts were added to the other purchases of superphosphate in compiling Table 12.

There were big increases in superphosphate used on Townsville stylo pastures in 1966-1967 and 1967-1968. These paralleled the increases in pasture sowings in those seasons, and could be attributed to extension activity.

TABLE 13.
Initial and maintenance superphosphate use.

	1967-68	Season 1968-69*	1969-70*
Number of properties:			
with new sowings	63	66	44
topdressing	—	51	45
Area covered (ac):			
with new sowings (fertilizer known)	31,236	26,550	33,181
with new sowings (fertilizer unknown)	2,500	1,309	10,303
by topdressing	—	21,009	—
Superphosphate used (tons):			
with new sowings	1,664	1,440	1,804
with topdressing	1,138	1,107	2,047
Total	2,802	2,547	3,851
Rate of superphosphate use (lb/ac):			
for new sowings	119	121	122
for topdressing	—	118	—

*Intended use.

Superphosphate applications at sowing are compared with those for top dressing in Table 13. There appeared to be an increase in the proportion used for top dressing in the intended applications for 1969-1970. The average rate of application was 120 lb/acre for both sowing and top dressing.

Hay yields

1,080 acres were cut for 73,700 bales of hay in 1968 (Table 14). The largest area cut and the largest hay yield was on agricultural leases, although missions and settlements obtained the highest yield per acre. If it was assumed that the average weight per bale was 40 lb, the total yield was 1,300 tons, or 1.2 tons per acre. This suggested that a substantial proportion of the Townsville stylo was left unharvested on the paddock.

TABLE 14.
Hay yields in 1968.

Type of holding	No. of properties cutting hay	Total area cut (ac)	Total hay yield (bales)	Bales per acre
Pastoral leases	2	75	3900	52
Agricultural leases	11	584	37159	64
Missions and Settlements	3	109	11200	103
Other	5	315	21450	68
	21	1083	73709	68

DISCUSSION

Management interest grew rapidly during the period 1964-1968, if the number of enquiries and the areas sown to Townsville stylo were suitable indicators. This increase in interest was considered to be due to demonstrations on experiment farms of the dry season feeding value of this pasture, and to demonstration paddocks established on a number of pastoral leases, stations and farms. In addition, new managers have come to the Northern Territory, along with changes in ownership of some of the properties.

There was increased confidence in the economics of pasture improvement following the increase in cattle prices that came with the establishment of export abattoirs in Darwin and Katherine. Better availability of credit came with changes in land tenure and the activities of the Commonwealth Development Bank. Companies with interests outside the Northern Territory also brought in funds with a view to development and taxation savings.

The distribution of Townsville stylo pastures in the Northern Territory up to 1968 was considered to be due to historical accident and to transport and accessibility, rather than to limitations of climate and soil. Townsville stylo is thought to have been introduced and spread as hay by mustering camps on several of the pastoral leases close to Darwin as early as 1914-1915. Favourable soil and climate and close grazing by feral buffalo encouraged it to spread over approximately 22,000 acres on those properties by 1960. The Darwin and Katherine areas also had relatively good roads and year-round access; they were close to markets and sources of fertilizer, seed and machinery; they had relatively poor native pastures; and they enjoyed greater agricultural extension.

The Darwin and Gulf District contains most of the Townsville stylo in the Northern Territory and for the three years to 1968 there were an average 199,000 cattle in this District. These would have required 4 to 10 times the existing area of Townsville stylo to wholly support them, so there was no immediate restriction on the expansion of the area of these pastures due to insufficient cattle to utilize them. However, the area under these pastures can be increased much more quickly than the number of cattle in the area can be increased through natural growth. This restriction can be overcome by the purchase of cattle from elsewhere, if the cattle and finance are available.

The above limits are expected to become less important as time goes on, and to be replaced by limits of climate. Townsville stylo adaptation, soil and economic returns. In 1968 the commercially useful Townsville stylo pastures were in areas receiving more than 28 inches average annual rainfall, those around Katherine having an average annual rainfall of 36 inches. Small trial paddocks existed in areas receiving rainfalls of 23 to 28 inches, and there were reports of Townsville stylo plants in areas receiving 18 to 23 inches. The lower rainfall limit was thus not adequately explored by 1968. Some varieties of Townsville stylo may have lower rainfall limits than others. A rainfall limit for production should be differentiated from one for Townsville stylo regeneration, as a Townsville stylo community which is able to regenerate need not be a productive one under grazing. The soil limits appeared to be much wider than supposed in earlier years. Attempts to establish it on black cracking clays, such as found on the coastal flood plains or Mitchell grass country, have been unsuccessful. However, it was growing on many other soil types, even on steep rocky slopes. Thus black cracking clay and bare rock appeared to be the only limiting substrates.

This short period of active Townsville stylo development does not provide a satisfactory guide to future development. The survey results showed an increase in intended sowings and superphosphate usage during 1969-1970 compared with the two previous seasons. Since the survey was conducted, one property decided to increase its 1969-1970 sowing by 4,000 acres to 10,000 acres, bringing the total intended sowing for that season to 47,000 acres. Sowings during the next few seasons might be of the order of 30,000 to 40,000 acres per season. But sowings and fertilizer use still depend on factors which can change quickly and unpredictably such as beef markets, cattle prices and alternative land uses.

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