Broadleaf P4: A FIELD TRIAL ASSESSMENT OF THE EFFECTS ON GRASSLAND GROWTH

The trials set out below were conducted in two forms, in order to establish (a) the value of incorporating BROADLEAF P4 into soil as an aid to seed germination and seedling establishment on newly sown areas, and (b) the value of BROADLEAF P4 to established grasslands under severe conditions of moisture stress.

Design and results

(i) NEW GRASSLAND

Trials were conducted on a section of the Chalk Downland in Southeast England where an area of road verge had been destroyed by roadway maintenance and required reseeding. After regrading the surface and preparation of a seedbed, four plots each 1m x 1m were marked out. Two plots were sown directly whilst the other two were treated with 100g/m^2 of BROADLEAF P4 cultivated into the surface 10 cms. On a larger scale the polymer would, of course, be broadcast onto the surface and incorporated by machinery normally used on landscape development sites.

Plots were sown at a rate of 75 Kg/ha with a low-maintenance amenity grass mixture. Each was then watered to field capacity, left for 24 hours, and then watered again to field capacity. No further irrigation was carried out. In the succeeding 14 days only two periods of natural rainfall occurred, the first being no more than light rain lasting for 3-4 hours over a 24 hour period (3 days after sowing) and the second a thunderstorm with heavy rain for 40-50 minutes (5 days after sowing). No further inputs of water occurred between the fifth and fourteenth days after seeding apart from early morning dew and two short periods of very light drizzle.

A germination count was taken 7 days after sowing and a further count of seedling establishment after 14 days. The results are summarised in Table 1. They show that BROADLEAF P4 resulted in a small improvement in seed germination but a dramatic improvement in seedling establishment. The small effect on germination was probably due to the lack of any real moisture stress over the first 8 days due to the initial watering and supplementary inputs from rainfall. Had the initial watering not been carried out it is likely that the difference between untreated and treated plots would have been more distinct.

The effects of BROADLEAF P4 on seedling establishment were very distinct. With daytime air temperatures in the range 22-26^{o} C in the 8 to 14 day period after sowing, the surface soil rapidly dried out. In the untreated plots water levels declined to wilting point after 12 days and to permanent wilting point soon afterwards. Plots treated with BROADLEAF P4 supported healthy, vigorous grass seedlings at the 14-day stage. Clearly the water absorbed by the polymer was compensating or overcoming the drought conditions in the soil probably because of the slower rate of loss by evaporation. Also, it is clear from Table 1 that a more efficient use of the polymer-absorbed water had been brought about by the close association of the root system and the hydrated polymer.

In conclusion, it is clear that incorporation of BROADLEAF P4 can achieve significant improvements in the establishment of ground cover vegetation under conditions of moisture stress. Where post-seeding weather conditions are unpredictable, or where the soil is known to be prone to drought, BROADLEAF P4 can be used to greatly improve the prospects of success on the first seeding thereby avoiding costly re-treatment due to initial failure.

(ii) ESTABLISHED TURF

A second series of trials were set up on garden lawns and on a golf-course tee-off platform in southern England. Again, due to the hot, dry weather the established swards were suffering from severe dieback and had adopted the yellow-brown colour typical of necrotic and dead vegetation. Grasslands do, however, have remarkable powers of recovery when conditions return to normal. This is particularly true of grasslands made up of species with slender, creeping rhizomes (e.g. creeping red fescue, smooth stalked meadow grass) for these provide a greater resistance to drought.

Two garden lawns and the golf-course site were used for the trials with BROADLEAF P4. At each site one area of $1m^2$ was marked out for treatment with the polymer and a similar area was defined as a control site. The turf was carefully removed from each site (treated and untreated) and the surface 10 cms of soil removed. This soil was either returned directly (untreated) or returned after mixing with 100 gms of BROADLEAF P4 granules. After replacement of the turf the plots were soaked to field capacity and then re-watered after 24 hours.

The weather conditions during the three weeks following setting up of the plots were similar to those described previously but included a two-week period during which effectively no rainfall occurred. At the end of each week the plots were harvested to provide fresh weight yields. It is clear from the results in Table 2 that BROADLEAF P4 was of considerable benefit in helping the grassland to survive the temporary drought.

After the two weeks dry spell the control plots, whilst they showed good initial growth after watering, had returned to a poor condition showing yellowing of the leaves and a large amount of dead or necrotic tissue. On the other hand the BROADLEAF P4 treated plots were green, healthy and still growing vigorously. The effects of BROADLEAF P4 were to extend, by at least 10 days, the onset of wilting and deterioration. It was not possible to establish how much longer the treated plots would have maintained their healthy growth because heavy rainfall replenished the soil moisture levels. Similar trials but under the controlled conditions of the glasshouse suggest that the 10-day figure is somewhat conservative.

Conclusion.

(a) BROADLEAF P4 polymer granules can be easily mixed with surface soil either by hand or mechanically. The polymer starts to absorb moisture immediately upon contact with water or moist soil. It then shrinks when water is extracted by growing plants but re-expands again and again when rainfall occurs or when irrigation water is supplied.

(b) BROADLEAF P4 is a valuable aid to the landscape architect, contractor and groundsman. By absorbing water and slowly releasing this moisture store, BROADLEAF P4 can assist newly seeded areas and established turf to overcome temporary drought.

TABLE 1

Effects of Broadleaf P4 on germination and establishment of grasses

		Germination* (Emergent seeds/m^2)	Mean	Established seedlings* (m^2)	Mean
Untreated plots	1	890	877	174	194
	2	865		214	
BROADLEAF P4-treated plots	1	973	980	792	769
	2	987		746	

*Determined by counting within 10 sub-squares of 10 x 10 cm and multiplying the values by 10.

TABLE 2

*Effects of Broadleaf P4 on established turf under drought conditions**

	Garden Lawns				Golf-course tee site	
	Treated	Untreated	Treated	Untreated	Treated	Untreated
After 1 week	13.2	12.1	10.3	11.0	16.1	14
After 2 weeks**	14.1	10.7	10.2	8.4	15.8	12.2
After 3 weeks**	17.5	2.1	8.2	3.7	14.9	6.4

* grams per square metre of yield

** yield between weeks 1 and 2 and between 2 and 3 respectively