 As presented in PN5

HO/2 COMPOSTS FOR CONTAINER PLANT PRODUCTION

The first component of this project - "Overwintering and shelf life as influenced by compost structure and use of polymer or wetting agent" - was established at Efford E.H.S. during 1987.

Progress report:

Composts of varying structure ie. very open, moderately open, average, poor (25, 18, 12 and 7% Air Filled Porosity) were designed by Neil Bragg ADAS Wolverhampton and used in combination with polymer (Broadleaf P4) or wetting agent (Aqua-Gro). Plant species with clearly defined wilting stages (ie. Hydrangea, Apple Mint and Mimulus) were potted in these mixes during late June 1987, half were overwintered outdoors on gravel beds and the remainder were placed under protection.

Following a relatively mild winter final records were taken in late May/early June to determine AFP and assess shelf life after wetting to field capacity.

Shelf life assessments were carried out in a 'standard' environment under glass to determine the number of days taken to show:
i) first signs of wilting ii) half of plot wilted iii) entire plot wilted.
Dry weights of the plants were also obtained.

Recording was carried out in detail for Hydrangea but was limited for Apple Mint and Mimulus since the latter two species suffered severely from gale damage.

Shoot and root growth of Hydrangea did not appear to vary relative to compost/polymer-wetting agent combination. This was partly reflected in plant dry weight values. However in mixes which were untreated or contained polymer there was a trend of increased dry weight as AFP declined.

AFP tests indicated that, with the exception of the 'poor' mix, values obtained in Summer 1988 (Tables 1 and 2) were comparable with initial design.
The increase in AFP of 'poor' mixes from initial value of 7% to values of 11-16% at the end of the trial could have been due to air spaces created by loss of fine particles through holes in bottom of the pots.

Growing Media Analyses - Available Nutrients

Data relating to these is presented in Appendix III, Tables 7 and 8, pages 33 and 34. These were taken four weeks past potting from the *Prunus* across the eight CRF treatments with and without KPA added. A standard analysis was used, taking $^{1}/_{15}$ litre from the sample taken and extracting nutrients in 400 ml of water, which was then analysed as for a liquid feed sample.

The major influence on available nutrients was the presence or absence of KPA, as might be expected with a sample close to potting. All mixes with KPA had somewhat higher conductivity, phosphorus, potassium, ammonium N and nitrate N levels than their corresponding mix without KPA. All levels were, however, still all generally within acceptable limits.

Considering the range of rates used with both Ficote and Osmocote Plus formulations, the levels of available nutrients in the growing media were remarkably similar, all falling within the same or one Index higher value.

Conductivity Measurements

These were taken at monthly intervals over a six month period using a PET Havenaar conductivity meter with a probe inserted into the containers on the bed. The results are shown in Appendix IV, Tables 9, 10 and 11, pages 35 and 36; each figure is an average of three replicates with six plants per replicate.

The influence of KPA addition was also picked up on the conductivity measurements in the first month (July), with values slightly higher where it was included. This effect had largely disappeared by the second reading in August and thereafter levels were similar between ± KPA treatments.

The effect of rate and type of fertilizer on conductivity levels also followed the pattern observed in the 4 week available nutrient analysis, with levels in general largely similar regardless of treatment. Conductivity levels did fall over time with those in October/November considerably lower than the earlier readings, and here the higher rates of fertilizer were beginning to show slightly higher readings than the lower rates in the majority of formulations.

CRF Granules: Residual Analysis

A residual analysis of nutrients remaining in the various CRF formulations was done in November 1994. This involved taking a representative sample of 50 granules from the container which were then ground and total nutrients remaining measured using an acid extraction method. A sample of unused granules was also analysed in a similar manner to enable the percentage

TREATMENTS

Growing Environments : Outdoors
Under protection (Polythene roof/netting sided structure)

Compost Structure :

	Air Filled Porosity (approx.)
Very Open	24
Moderately Open	18
Average	12
Poor	7

These structures were achieved by mixing the various fractions of peat sieved from Irish peat bales with 30% super fine, standard or coarse grade perlite. The mixes are of a somewhat 'artificial' nature in relation to what the nursery stock industry are using but enable comparisons of the various treatments using the same basic ingredients.

Wetting Agents/Polymers

a. Polymer: Broadleaf P4 at 1.0 kg/m^3 of compost. Incorporated at mixing in "half" hydrated state

b. Wetting Agent : Aqua-Gro at 1:400 dilution

Drenched through pots at various points in production schedule.

	Immediately after potting	October 1988	Pre Shelf Life Test 1989
3.	✓	✓	✓
2.		✓	✓
1.			✓

c. Untreated Control

Species :		Pot Size
	Hydrangea 'Mme J de Schmedt'	2 litre
	Herbaceous 'Lupinus'	1 litre
	Alpine 'Edelweis'	90 mm

Method : Rooted cuttings (or module raised seedlings) were potted late July 1988 and grown on gravel beds under the appropriate environment. Limited plot size and a fully randomized trial makes differential irrigation of the different compost structures difficult and the trial is therefore being hand watered.

Assessments: Overwintering and shelf life assessments will be made late April 1989.

TRIAL 2. INFLUENCE OF NUTRITION DURING PRODUCTION ON SHELF LIFE

Influence of nutrition on overwintering and shelf life was monitored Spring 1988 using plants from the controlled release fertilizer screening trial.

(Progress of these trials are reported in relevant issues of HDC HONS project news).

Presented at Efford, 5.11.88 — Full Report expected before ?NC

6. HO/2 - COMPOSTS FOR CONTAINER PLANT PRODUCTION

Object : To investigate effects of compost structure and nutrition on subsequent winter quality and shelf life.

Background

Good compost structure is important for crop growth especially if taking plants overwinter for Spring sales. The "Openness" or Air Filled Porosity (AFP) will depend on the system of production, gravel beds requiring a more open structure than where drained sand beds or protection are in use.

With the trend in the industry to grow plants in more open structured mixes problems are being created in the sales area since these mixes require greater attention to watering. Hence the interest in potential use of wetting agents/polymers for improving shelf life (water holding capacity) of the more open structured composts.

Nutrition is also an important aspect of quality in overwintering and shelf life. There is particular interest in the newer formulations of controlled release fertilizers with extended release patterns which can reduce the need for top dressings overwinter or pre-sale.

The project is planned over three years 1987-1990. In this second year of the work a trial comparable to that of 1987/88 (with refinements) has been established to consolidate results.

TRIAL 1. OVERWINTERING AND SHELF LIFE AS INFLUENCED BY COMPOST STRUCTURE AND USE OF POLYMER OR WETTING AGENT (1987-1988, 1988-1989)

Object : To re-look at the potential of a wetting agent or polymer for improving shelf life of plants grown in a range of compost structures.

Problems of experimental procedure had been encountered in previous trials with wetting agents/polymers due to the subjective nature of "when to water". This made it difficult to obtain quantitative data for comparative assessments on water required or frequency of watering during crop production. Thus in this trial work will concentrate on the influence of a representative wetting agent or polymer on shelf life as indicated by time taken for plants to wilt.

Plants selected for inclusion are those which have a rapid and clearly defined wilting stage. Since shelf life of smaller pots is more critical herbaceous and alpine species are included as well as a shrub.

This work is being done in collaboration with ADAS Soil Science, Wolverhampton.

The addition of wetting agent did not appear to influence AFP values. However, in the presence of polymer AFP values for the 4 types of structure were 40-50% greater than untreated controls.

Shelf life assessments - shown as number of days to first sign of wilting (Tables 1 and 2) - indicated that the addition of polymer or application of wetting agent X1, X2 and X3 did not extend the 'time to wilt' period.

It must be stressed that these are preliminary observations on 'raw data'. The data will be statistically analysed before definite conclusions are drawn.

A comparable trial (with refinements in experimental techniques) is currently being established to consolidate these results in order to apply them to the needs of the industry.

Dr. Ruth Finlay
Efford EHS
July 1988

Table 2

Air Filled Porosity % - Summer 1988;
Number of days to first sign of wilting (values shown in brackets);
for Hydrangea overwintered under protection.

Compost structure: Wetting agent/Polymer	Very open	Moderately open	Average	Poor
Untreated control, U	21.5 (18.0)	15.4 (21.7)	8.4 (24.8)	11.4 (25.6)
" "	21.8 (21.1)	13.6 (22.7)	9.4 (25.7)	10.6 (23.3)
Polymer, P	26.1 (18.2)	22.2 (22.7)	16.1 (25.7)	14.0 (25.3)
Wetting agent (X1), W_1	22.7 (17.8)	16.3 (27.8)	14.4 (24.6)	16.2 (21.1)
Wetting agent (X2), W_2	22.2 (20.4)	15.7 (23.7)	10.0 (24.0)	12.7 (21.6)
Wetting agent (X3), W_3	21.4 (27.6)	14.7 (22.2)	9.6 (26.0)	12.7 (22.0

Table 1

Air Filled Porosity % - Summer 1988;
Number of days to first sign of wilting (values shown in brackets);
for Hydrangea overwintered outdoors.

Compost structure: Wetting agent/Polymer	Very open	Moderately open	Average	Poor
Untreated control, U	20.6 (19.4)	12.1 (19.4)	10.6 (22.4)	11.0 (25.4)
" " " "	21.3 (17.4)	10.9 (19.6)	8.5 (20.8)	12.1 (24.4)
Polymer, P	23.6 (17.9)	18.4 (19.1)	14.8 (21.0)	15.9 (17.5)
Wetting agent (X1) W_1	21.2 (14.7)	13.3 (18.1)	12.6 (20.0)	16.1 (16.1)
Wetting agent (X2) W_2	22.2 (19.3)	12.7 (18.6)	10.2 (18.7)	12.8 (19.9)
Wetting agent (X3) W_3	21.8 (20.4)	11.5 (18.7)	12.3 (18.5)	11.4 (21.5)

EFFORD EXPERIMENTAL HORTICULTURE STATION

PLOT	DATE	INITIALS	No of EXPERIMENT

Edelweiss

REPLICATE 1				REPLICATE 2				REPLICATE 3			
Bed	39	Bed	40	Bed	37	Bed	40	Bed	39	Bed	40
1	3W1	37	3P	13	3μ	49	3W3	25	1W3	61	2W3
2	4μ	38	2W2	14	1W1	50	4μ	26	3W3	62	2μ
3	4W1	39	1μ	15	1μ	51	2P	27	3μ	63	4W1
4	2W3	40	3W3	16	3W1	52	4W2	28	2W1	64	4P
5	4μ	41	2P	17	4W3	53	2W3	29	4μ	65	2W2
6	2W1	42	1W2	18	1μ	54	2μ	30	3W1	66	3P
7	1μ	43	3μ	19	3μ	55	1W2	31	4W3	67	1W1
8	4P	44	1P	20	3W2	56	4P	32	3μ	68	1μ
9	1W1	45	3W2	21	1P	57	2W2	33	1P	69	3W2
10	3μ	46	2μ	22	2W1	58	1W3	34	4W2	70	2μ
11	1W3	47	4W3	23	3P	59	4W1	35	1μ	71	2P
12	2μ	48	4W2	24	2μ	60	4μ	36	4μ	72	1W2

Hydrangea

REPLICATE 1				REPLICATE 2				REPLICATE 3			
Bed	39	Bed	40	Bed	37	Bed	38	Bed	37	Bed	38
73	1μ	109	3W1	85	2W1	121	3W2	97	4W3	133	4μ
74	1P	110	2μ	86	3P	122	1μ	98	2μ	134	3W1
75	1W2	111	3μ	87	2μ	123	3μ	99	2W2	135	3P
76	4μ	112	4W2	88	4W2	124	1W2	100	4W1	136	1μ
77	1W1	113	3W3	89	4W1	125	2W3	101	3μ	137	1W1
78	4W3	114	4W1	90	3W1	126	4P	102	1μ	138	1P
79	2μ	115	3μ	91	2μ	127	1μ	103	2W3	139	4W2
80	2W1	116	4μ	92	2P	128	4μ	104	1W3	140	4P
Bed	37	Bed	38	93	3μ	129	1W3	105	2μ	141	3μ
81	1W3	117	2W2	94	2W2	130	4μ	106	2W1	142	2P
82	3W2	118	2W3	95	1W1	131	1P	107	1W2	143	4μ
83	2P	119	1μ	96	4W3	132	3W3	108	3W3	144	3W2
84	4P	120	3P								

Lupin

EFFORD EXPERIMENTAL HORTICULTURE STATION

PLOT | DATE | INITIALS | No of EXPERIMENT

Replicate 1				Replicate 2				Replicate 3			
Bed 33		Bed 34		Bed 33		Bed 34		Bed 33		Bed 34	
145	3P	181	2P	157	1W3	193	1P	169	1P	205	4μ
146	4W1	182	2μ	158	3μ	194	2P	170	3W1	206	4P
147	3μ	183	4W3	159	2W3	195	4W2	171	1μ	207	3μ
148	3W1	184	1μ	160	4μ	196	4P	172	2W1	208	3W3
149	2W3	185	4W2	161	4W3	197	1μ	173	2W3	209	3μ
150	1P	186	1W3	162	3P	198	1W1	174	3P	210	2μ
151	4P	187	1μ	163	1W2	199	4μ	175	4W2	211	1W2
152	4μ	188	1W2	164	2W1	200	3W2	176	1W3	212	4μ
153	3W3	189	1W1	165	2μ	201	4W1	177	4W1	213	2μ
154	4μ	190	2μ	166	3μ	202	2μ	178	4W3	214	1μ
155	3W2	191	2W2	167	1μ	203	2W2	179	2P	215	2W2
156	3μ	192	2W1	168	3W1	204	3W3	180	3W2	216	1W1

KEY

Composts		Wetting Agents	
1	Very Open	P	: Broadleaf P4
2	Moderately Open	W3	: Aquagro on 3 occasions
3	Average	W2	: " " 2 "
4	Poor	W1	: " " 1 "
		μ	: Untreated

EFFORD EXPERIMENTAL HORTICULTURE STATION

PLOT	DATE	INITIALS	No of EXPERIMENT
Hydrangea			

REPLICATE 1		REPLICATE 2		REPLICATE 3	
Bed	22	Bed	23	Bed	24
265	4µ	337	2W1	409	4W3
266	4W3	338	3µ	410	1W2
267	1W1	339	1µ	411	1W3
268	2W3	340	1W3	412	2µ
269	4µ	341	3W1	413	4W1
270	3W2	342	4µ	414	2W3
271	2W1	343	2W3	415	2µ
272	3µ	344	2W2	416	3W2
273	2W2	345	3P	417	1µ
274	3W3	346	4W1	418	2W1
275	3P	347	3µ	419	3µ
276	1µ	348	3W2	420	4P
277	3W1	349	2µ	421	3W1
278	4P	350	1W1	422	1P
279	1W2	351	1P	423	2W2
280	2µ	352	3W3	424	4µ
281	4W1	353	4W3	425	3P
282	1W3	354	4W2	426	3µ
283	4W2	355	4P	427	4W2
284	2µ	356	2µ	428	1µ
285	2P	357	2P	429	3W3
286	1P	358	4µ	430	4µ
287	µ	359	1W2	431	1W1
288	3µ	360	1µ	432	2P

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EFFORD EXPERIMENTAL HORTICULTURE STATION

PLOT	DATE	INITIALS	No of EXPERIMENT
Lupin		Edelweiss	

Lupin REPLICATE 1		Lupin REPLICATE 2		Lupin REPLICATE 3		Edelweiss REPLICATE 1		Edelweiss REPLICATE 2		Edelweiss REPLICATE 3	
Bed	19	Bed	20	Bed	21	Bed	19	Bed	20	Bed	21
217	2P	289	1μ	361	2P	241	4W2	313	3μ	385	2P
218	3W1	290	3W1	362	1W1	242	2W2	314	4μ	386	1μ
219	4W2	291	3μ	363	3W3	243	2μ	315	1W3	387	3P
220	4P	292	3W2	364	1W2	244	1W3	316	2W1	388	2W3
221	3μ	293	1μ	365	3P	245	1W2	317	4P	389	1μ
222	3P	294	3W3	366	1μ	246	3W3	318	2μ	390	1W3
223	2W1	295	2W1	367	2W3	247	2μ	319	1W2	391	4μ
224	2W3	296	2μ	368	2μ	248	3W1	320	3W3	392	2W1
225	3W2	297	3P	369	4W2	249	3W2	321	4W2	393	4μ
226	4W1	298	4W2	370	3W2	250	4μ	322	1W1	394	3μ
227	4μ	299	1W1	371	4W3	251	2P	323	1μ	395	1W1
228	1W3	300	2μ	372	4μ	252	3μ	324	3W1	396	2W2
229	2W2	301	4W1	373	1μ	253	1W1	325	2W3	397	2μ
230	1μ	302	4μ	374	2W1	254	4W1	326	1P	398	4P
231	3W3	303	4P	375	3μ	255	2W3	327	3μ	399	3W2
232	3μ	304	1W3	376	2W2	256	4P	328	3W2	400	3μ
233	1P	305	1P	377	2μ	257	4μ	329	4W3	401	3W1
234	1μ	306	1W2	378	3W1	258	2W1	330	4μ	402	2μ
235	1W2	307	3μ	379	4P	259	1μ	331	2W2	403	4W2
236	4μ	308	2P	380	3μ	260	1P	332	4W1	404	4W3
237	4W3	309	2W3	381	4μ	Bed	22	Bed	23	Bed	24
238	2μ	310	2W2	382	4W1	261	4W3	333	1μ	405	1P
239	1W1	311	4W3	383	1P	262	3μ	334	3P	406	1W2
240	2μ	312	4μ	384	1W3	263	3P	335	2P	407	3W3
						264	1μ	336	3μ	408	1W1

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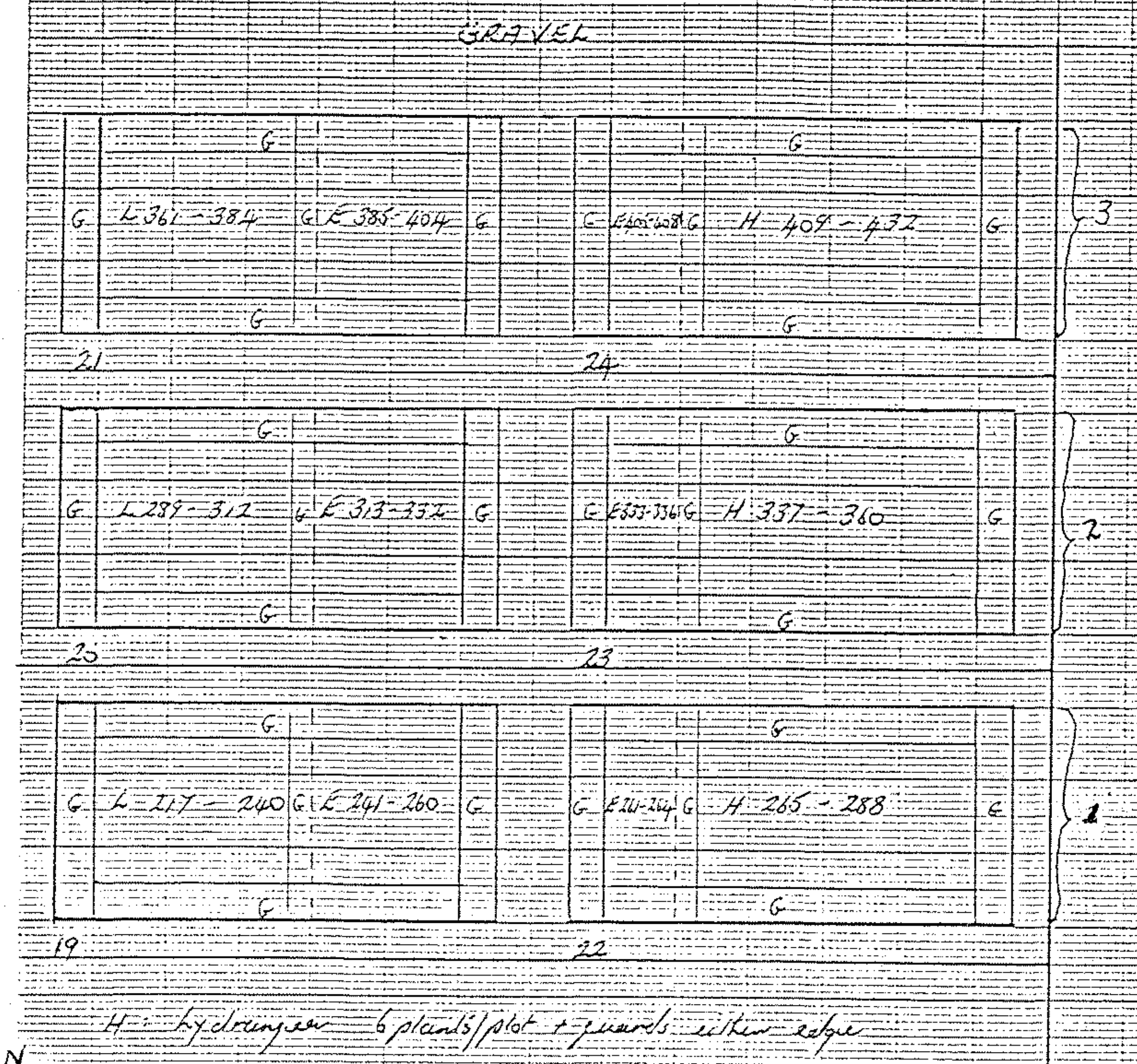


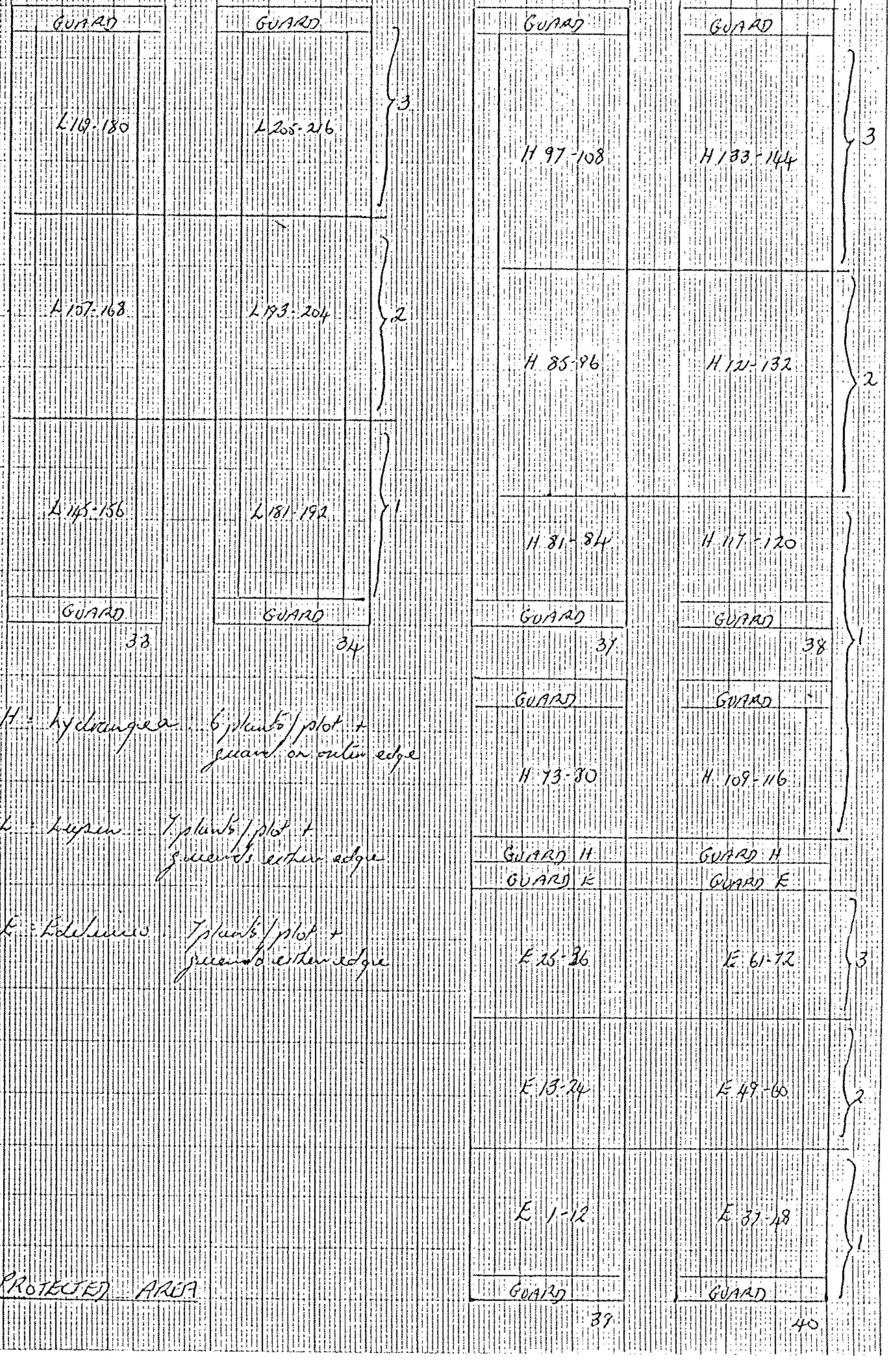
H : hydrangea — 6 plants/plot + guards either edge

L : lupin — 7 plants/plot + guards either edge

E : Edelweiss — 7 plants/plot + guards either edge

Yellow labels = spares

COMPOST STRUCTURE x WETTING AGENT POLYMER (HDC) 1988



H: Hydrangea 6 plants/plot + guard on outer edge

L: Lupin 7 plants/plot + guards either edge

E: Edelweiss 7 plants/plot + guards either edge