2 seed orchards where the population of B. colfaxiana was known to be low. The results of these tests are shown in table 3. Only mixtures of the cis and trans isomers of 9-dodecen-1-ol were tested since only one area of activity was obtained from both column chromatography, and from the gas chromatographic splits, and none of the other dodecen-1-ol tested in 1975 were active.

The numbers of moths trapped with the isomer mixtures are too low to be meaningful. No trap baited with synthetic chemical caught more males than those containing virgin females. From the Mesachie Lake results it can be seen that with increasing amounts of the trans isomer, the trend is decreasing attractancy. In another test the catch of male B. colfaxiana trapped with varying amounts of lure was ascertained. The results are presented in table 4 and show an increase in the number of males caught as the amount of lure is increased indicating a need to trap in a denser population.

In summary, field data from 1975 and 1976 indicate that trans-7-dodecen-1-ol is a potent attractant for male L. youngana and that the attractancy is dependent on isomer ratio. Similarly field results have shown that cis-9-dodecen-1-ol is attractive to male B. colfaxiana while the preliminary results of the chemical analyses are consistent with the natural pheromone containing a dodecen-1-ol. Further work is in progress.

The growth-retarding effect of Alden in Spirodela oligorrhiza[1]

J. S. Knypl

Laboratory of Plant Growth Regulators, University of Lodz, 90-237 Lodz (Poland), 2 November 1976

Summary. Alden® (10^{-5} M) retarded growth and increased chlorophyll and protein contents in Spirodela, the effects being reduced by gibberellin and benzyladenine. Alden nearly doubled activity of soluble phosphatase and increased activity of RNase.

It has been reported that 1-allyl-1-(3,7-dimethyloctyl) piperidinium bromide (Alden®, piproctanylium) effectively retarded growth of higher plants and induced some physiological responses that could be ascribed to the action of ethylene[2].

Spirodela oligorrhiza (Kurz.) Hegelm. was grown on mineral medium containing 4 mM $(NH_4)_2SO_4$ as sole N source and 1% glucose, under permanent illumination (1.1 klx) at 25 °C[3,4]. 20 ml aliquots of the medium were inoculated with 10 fronds; calcium phosphate was used as buffering agent[5]. Alden was filter sterilized or autoclaved; gibberellic acid GA_3 and benzyladenine BA were sterilized by autoclaving. Growth was assessed by counting the number of fronds or by weight[3]. Chlorophyll and protein were determined as described[4]. Samples of 100 mg fr. wt were extracted with 4 ml of 0.05 M Tris-HCl buffer, pH 7.5, and cleared by centrifugation at 3500 g at 0 °C. Phosphatase activity in the supernatant was determined at pH 6.0, and RNase activity was determined at pH 6.0 in 0.033 M citrate[5,6]. Unit of phosphatase is defined as that amount of enzyme that released 1 µmole of p-nitrophenol per min at 30 °C. Standard unit of RNase is defined as that amount of enzyme which released 1 A_{260} unit (A_{260} of 1.0/ml) of soluble nucleotide from highly polymerized yeast RNA per min at 30 °C[7].

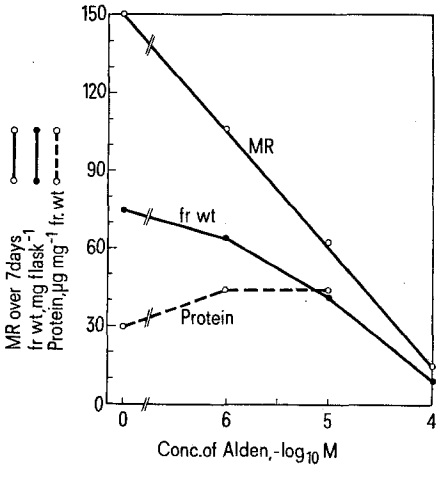

Fig. 1. Effect of different concentrations of Alden on growth and protein content in Spirodela as measured after 7 days of cultivation. Inoculum: 10 fronds per flask. Multiplication rate,

$$MR = \frac{1000\,(\log_{10}Fd - \log_{10}Fo)}{d}$$

where Fo, original number of fronds; Fd, No. of fronds on day d; d, number of days.

The multiplication rate MR of Spirodela was inversely related to the logarithm of the molar concentration of Alden (figure 1). Fronds became smaller, thicker and darker green than in the control; roots were shortened. All progeny plantlets remained attached to the mothers, forming large clusters of tightly packed overlapping fronds. Similar clusters were produced by other growth retardants[4]. Alden, in contrast to CCC and DMMC[4], did not evoke symptoms of inhibition of chlorophyll synthesis, even at concentrations completely blocking growth (5×10^{-4} M).

Growth of Spirodela was slightly stimulated by GA_3. Under the influence of BA, the MR was not changed, but fronds became larger and heavier than in the control[4]. The growth-retarding effect of Alden at the concentration of 10^{-5} M was markedly reduced by GA_3 and BA (table,

1 Acknowledgments. Original inoculum of S. oligorrhiza was kindly supplied by Prof. E. G. Bollard and Dr A. R. Ferguson of the Plant Diseases Division, D. S. I. R., Auckland, New Zealand. Alden® was kindly supplied by Dr. W. H. De Silva of Dr R. Maag Ltd., Chemical Works, Dielsdorf, Switzerland.

2 G. A. Hüppi, P. F. Bocion and W. H. de Silva, Experientia *32*, 37 (1976).

3 A. R. Ferguson and E. G. Bollard, Planta *88*, 344 (1969).

4 J. S. Knypl, S. Witek and M. Oświęcimska, Z. Pflphysiol. *79*, 53 (1976).

5 J. S. Knypl, Biochem. Physiol. Pflanzen *170*, 243 (1976).

6 E. Ambellan and V. P. Hollander, Analyt. Biochem. *17*, 474 (1966).

7 C. M. Wilson, A. Rev. Pl. Physiol. *26*, 187 (1975).

Effect of Alden® on fresh weight, total protein and chlorophyll contents, and soluble acid phosphatase and RNase activity in Spirodela oligorrhiza, as measured after 7 days of cultivation

Treatment (M)	Fresh wt (mg flask^{-1})	Total protein (mg. g^{-1} fr. wt)	Chlorophyll (mg. g^{-1} fr. wt)	Activity of phosphatase (U. g^{-1} fr. wt)	RNase (U. g^{-1} fr. wt)
Control	85[a]	29.4[a]	1.7[a,b]	2.7[a]	3.7[a]
GA_3 (5×10^{-5})	113[b]	28.8[a]	1.7[a]	2.7[a]	5.0[b]
BA (10^{-6})	116[b]	26.5[b]	1.3[c]	2.3[a]	3.1[c]
Alden (10^{-5})	38[c]	37.6[c]	2.2[d]	4.9[b]	5.9[d]
Alden + GA	62[d]	35.3[c,d]	1.9[b]	4.0[b,c]	4.8[b]
Alden + BA	71[e]	32.4[c,d]	1.6[a]	3.8[c]	4.6[b]

Inoculum: 10 fronds per flask. The data followed by unlike postscripts within each group of parameters differ significantly at the 1% probability level.

figure 2). The compound increased by 27% the protein and chlorophyll content per g fr wt (table). The effect on chlorophyll content has also been noted on grapevine, chrysanthemums and other ornamentals[8]. The effects of Alden on protein and chlorophyll content were significantly reduced in the mixtures with BA, which by itself markedly lowered the chlorophyll content per g fr. wt. Of special interest is the fact that GA_3 reduced the stimulatory effect of Alden on chlorophyll content (table).

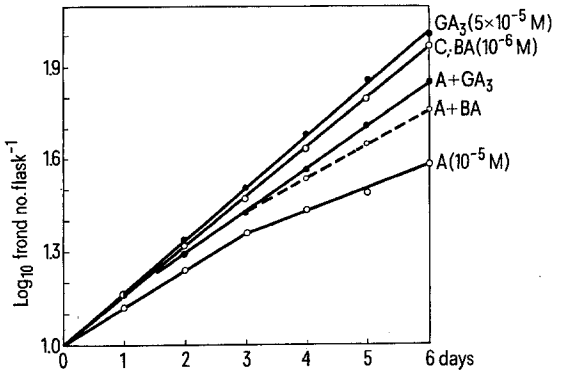

Fig. 2. Kinetics of growth of Spirodela under the influence of Alden, applied alone or in mixtures with GA_3 or BA. C, control.

Alden enhanced acid phosphatase and RNase activity by about 80% and 60%, respectively, in comparison with the control plants. GA_3 also stimulated RNase activity, but in mixtures the effects were not additive (table). In Spirodela there might be an adaptative alkaline phosphatase with pH optimum 7.5, besides a constitutive enzyme showing maximum activity at pH 6.0[9,10]. As phosphatase activity at pH 7.5 was enhanced by about 120% (not shown), against 80% at pH 6.0, Alden may induce the adaptative phosphatase isoenzymes[10].

This study revealed that Alden is about 5 times more active as a growth-retardant for Spirodela than CCC[4]. CCC at 10^{-4} M concentration inhibits chlorophyll synthesis as manifested by yellow colouration of young fronds, whereas Alden does not induce such an effect even at 10^{-3} M concentration. It is possible that Alden interferes with the biosynthesis and/or mode of action of gibberellins, as GA_3 most effectively reduced the symptoms of its action. Nevertheless, a) the increase of protein content in the Alden-treated plants seems to indicate that this compound retards protein breakdown, and b) as it stimulated activity of RNase and phosphatase, it may directly affect the phosphate metabolism in plants[9].

8 W. H. de Silva, personal communication.
9 M. S. Reid and R. L. Bieleski, Planta *94*, 273 (1970).
10 J. S. Knypl, 9th Intern. Conference on Plant Growth Substances. Collected abstracts of the paper demonstrations. PD No. 85, p. 196. Ed. P.-E. Pilet. Lausanne 1976.

Regulation of glucose transport in Aspergillus nidulans

J. D. Desai[1] and V. V. Modi

Department of Microbiology, Faculty of Science, M. S. University of Baroda, Baroda 390 002 (India),
20 September 1976

Summary. Pyruvate and acetate inhibited the uptake of glucose by Aspergillus nidulans; although there were significant variations in glucose uptake rate, the intracellular concentration of acetate was almost identical in biotin-supplemented, normal and deficient cells. The in vitro activity of glucose-binding protein was not affected by biotin, avidin, acetate or acetyl-CoA.

In our earlier studies we characterized the glucose transport system in Aspergillus nidulans as energy-dependent, against the concentration gradient, and requiring binding protein for its function[2]. The binding protein for glucose was isolated and purified in a homogenous state, as judged by the gel electrophoresis and its properties were described in detail[3]. In this communication, we wish to report a regulatory aspect of the glucose transport in Aspergillus nidulans.

Materials and methods. The strain, composition of the basal media and the cultural conditions used in the present investigations were the same as reported earlier[2,4]. Biotin