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DETERMINATION OF THE FLYING RADIUS OF *Acanthoscelides obtectus* (SAY 1831) (Coleoptera - bruchidae) USING ^{131}I AS RADIOACTIVE TRACER

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With the objective of determining the flying radius (activity) of the bean weevil (A. obtectus) 800 adult insects were labelled with sodium iodide ($Na^{131}I$ at 0.468 mCi/ml. In order to label the weevils they were kept on Petri dishes with filter paper embedded in 3.2 ml sodium iodide ($Na^{131}I$) radioactive solution. The labelled insects (over 800,000 c.p.m./individual at 5 cm distance) were released in the middle of a bean plantation cv. Rosinha G2 at physiological maturation stage. The labelled insects were located using a "Victoreen" monochannel gamma spectrometer with NaI (Tl) cristal, the countings in the field being repeated 8 times. The first two countings (2 and 3 hours after release) showed that the insects had flown in different directions, reaching a radius of 20 m distant from the releasing point. The 3rd and 4th countings (6 and 7 hours after release) indicate that they reached a radius of 30 m. According to the 5th countings (8, 50 and 54 hours after release) the dispersion of the insects continued, maintaining a radius of 30 m. At the last counting (120 hours after release) a greater uniformity in the dispersion rate was observed, probably because the insects adapted themselves to the local environmental conditions. It was also noted that during the day the insects were located under small aggregates or crop residues, close to the plants, but never on the foliage.

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ETHYLENE PRODUCTION FROM BEAN FLOWERS AND PODS

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Abscission of leaves, reproductive structures and fruits are regulated by the action of plant hormones and their interrelationships. Endogenous ethylene has been reported by many workers to be closely associated with abscission in many plant species. El-Beltagy and Hall (1) have reported that ethlene is the cause of flower and pod shedding in broad beans. Recently, Izquierdo *et al* (2) have suggested that ethylene could be related to reproductive abscission in dry edible beans (*Phaseolus vulgaris* L.). These authors further speculated that an ethylene induced effect could be inhibiting carbohydrate partitioning and remobilization during the time the first flowers are setting fruit causing the shedding of later formed flowers and pods.

A strong cause and effect relationship, if it exists in beans, between ethylene production and flower and pod shedding would be useful to the breeder as a tool for screening germplasm for low abscission potential. Bean flowers and pods are easy to collect and the procedures in vogue are rapid, reliable, and fairly inexpensive.

This article reports on ethylene production rates obtained from an experiment designed to ascertain the relationship between ethylene production and C-assimilate and ethylene production and abscission in beans. The three cultivars used, Black Turtle Soup, Tuscola, and NEP-II, were grown on the Michigan State University Botany Farm during the summer of 1979. The genotypes were grown in a complete block design with restricted randomization and four replications. Plant spacings within and between rows were such that the number of plants per hectare approximated the population density of a commercially grown crop.

Flowers and pods were sampled at five day intervals throughout the bloom period beginning eight days after the appearance of the first flower. The reproductive structures sampled were separated into categories consisting of 1) fresh flowers, 2) old flowers, 3) small pods, and 4) large pods. Categories of each cultivar were maintained separately and the organs were enclosed in gas tight 20 cc vacutainer tubes and incubated for 30 minutes. After this time, released ethylene was withdrawn from the vacutainer and analyzed with a gas chromotograph fitted with a column conditioned for the detection of ethylene gas.

Significant differences among cultivars, reproductive structures, and sampling periods were found for the rate of ethylene production (Table 1). Black Turtle Soup was a strong producer of endogenous ethylene over sampling dates in all tissues studied. Data published elsewhere has shown that for Black Turtle Soup, 67.0% of the total reproductive structures formed, abscise (2). Abscission percentages for Tuscola and NEP-II were 48.0 and 67.0%, respectively (2).

NEP-II produced less ethylene from flowers during the sampling periods (Table 1) and when compared to the other two cultivars, significantly fewer flowers abscised (2). The production of ethylene from flowers on Tuscola was intermediate between Black Turtle Soup and NEP-II and this was associated with an intermediate percentage of flower abscission compared to the other cultivars. Tuscola produced the least amount of ethylene from small pods of the three cultivars studied. This finding was associated with Tuscola's low and nonsignificant pod abscission percentage compared to Black Turtle Soup and NEP-II (2).

The present data supports the idea that in beans a strong relationship exists between endogenous ethylene produced by reproductive structures and abscission. While it may be difficult to establish a cause and effect relationship between endogenous ethylene production and abscission, our data strongly suggests an ethylene inductive role in the abscission process. Further work is necessary before the utility of using ethylene produced from reproductive organs as a technique for breeding is established.

Table 1. Ethylene production rate from field collected dry bean flower and pods at different times after flowering.

	Date:	8/3			8/8			8/13				8/18			
	DAF[1]	8			13			18				23			
CULTIVAR	Reproductive Structure:[2]	FF	OF	SP	FF	OF	SP	FF	OF	SP	LP	FF	OF	SP	LP
		nMole $C_2H_4 \cdot g^{-1}$ (fresh wt.). hr^{-1}													
TUSCOLA		0.55[z]	0.32	0.15	0.79	0.53	0.20	2.13	3.32	3.35	1.73	4.64	5.76	3.37	2.71
BLACK TURTLE SOUP		0.71	0.63	1.06	1.49	0.97	1.55	2.63	2.92	3.86	1.51	5.39	7.59	10.39	2.17
NEP - II		0.23	0.31	0.23	0.66	0.42	0.33	2.32	2.07	4.77	1.52	2.54	1.73	5.44	2.95
F-STATISTIC		*	*	*	*	*	*	N.S.	N.S.	N.S.	N.S.	*	*	*	N.S.
LSD (0.05)		0.23	0.23	0.56	0.34	0.29	0.50	-	-	-	-	2.26	2.47	3.66	-

[1] Days after flowering.

[2] FF: Freshly opened flower; OF: one day old flower; SP: small pod (less than 20mm in length); LP: large pod (more than 80mm in length).

[z] Mean of 4 field replications and 3 samples per replication

References

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CORRELATION OF SOME PARAMETERS AND GROWTH FACTORS WITH THE YIELD OF DRY MATTER ON BEAN PLANT (Phaseolus vulgaris L.)

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The growth parameter generally used to select varieties to Al and Mn tolerance is TDW. Measurements of TDW are laborious and time-consuming especially when a large number of cultivars are handled. Therefore, the search for another less laborious and time-consuming parameter of analysis having good correlation with TDW is necessary.

The objective of this study was to determine growth factor or parameter which can substitute TDW in evaluating cultivars sensitivity to Al/or Mn.

Three bean cultivars were selected from a previous experiment for their reaction to Al/or Mn. They are 'Rio Tibagi' - sensitive to aluminium, 'Mulatinho Paulista' - tolerant to aluminium, and 'Goiano Precoce' - sensitive to manganese. Growth parameter and nutrient data were collected:

RL - root length (cm)
PH - plant height (cm)
RDW - root dry weight (g)
SDW - shoot dry weight (g)
TDW - total dry weight (g)
$\overline{X}$ - average of parameters and growth factors
PR - phosphorus on the roots (%)
PS - phosphorus on the shoots (%)
MnR - manganese on the roots (ppm)
MnS - manganese on the shoot (ppm)

and all possible correlations calculated (Table 1 and 3).

SDW can be considered a better growth parameter for differentiation of varieties with respect to both Al and Mn effect than PH, RDW and TDW. SDW presented the best correlation coefficient with TDW and is easily determined.

Apparently SDW meets these requirements needed and the correlations