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ESTIMATION OF LEAF AREA IN PUMPKIN FROM LEAF DIAMETER

In vegetable crops like pumpkin where the leaves are big and lobed, measurement of leaf area is difficult. This study was taken up to arrive at a suitable method to estimate the leaf area of intact leaves of pumpkin. The variety chosen for the study was CM 14. A total of 100 leaves was selected randomly from the plants at three stages, viz., 30, 60 and 95 days after sowing. The maximum width of the leaves chosen was measured and it ranged from 10 cm to 27.4 cm. The actual area of each of these leaves was determined by the graph paper method (Kvet and Marshall, 1971). Correlation coefficient was worked out between actual leaf area and the maximum width of the leaves. A high positive significant correlation of 0.97 was obtained. Regression equations were fitted tofind out the relationship between actual area and maximum width of the leaf, using equations of the type $A = ax + b$, $A = ax$ and $A = ax^2$. The first of these equations had the value, $A = 25.85x - 219.7$ where A is the leaf area in cm^2 and x the maxmium width of the leaf in cm. This equation has a predictability of 94%. This equation, however, has the disadvantage of being applicable only for a particular range of leaf diameter values. At a value of 8.5 cm the predicted value of A equals zero. Even above this value, there was a marked deviation between the predicted area and actual area upto a leaf diameter value of 13 cm as can be seen from Fig 1. Also in the case of leaf diameter values above 25 cm, the predicted values of leaf area was found to be considerably lower than the actual area (Fig 1). Hence this equation would be practically suitable only for leaf diameter values within a range of 13 cm and 25 cm. With a mode) of the type $A = ax$, the equation was worked out as $A = 14.1x$. This equation had a substantially lower predictability of 75% and would be suitable only for certain leaf diameter values (Fig 1). When the model $A = ax^2$ was used, the equation was $A = 0.72x^2$. The predictability of this equation came to94%. As this equation has the same predictability as the first model and as this would be applicable over a wider range of leaf diameter values, this is suggested as the most suitable for the prediction of leaf area from diameter measurements. This would also be theoretically superior to the first model for diameter values below 8.5 cm and above 25 cm. From this equation, the multiplying factor can be worked out as 0.72 with which the quare of measured leaf diameter may be multiplied to get an estimate of area. Data on the predicted leaf area from the three models corresponding to the diameter values upto 28 cm are givan in Table 1 and the graphical representation of these along with the scatter diagram showing actual measured leaf area values are given in Fig 1.

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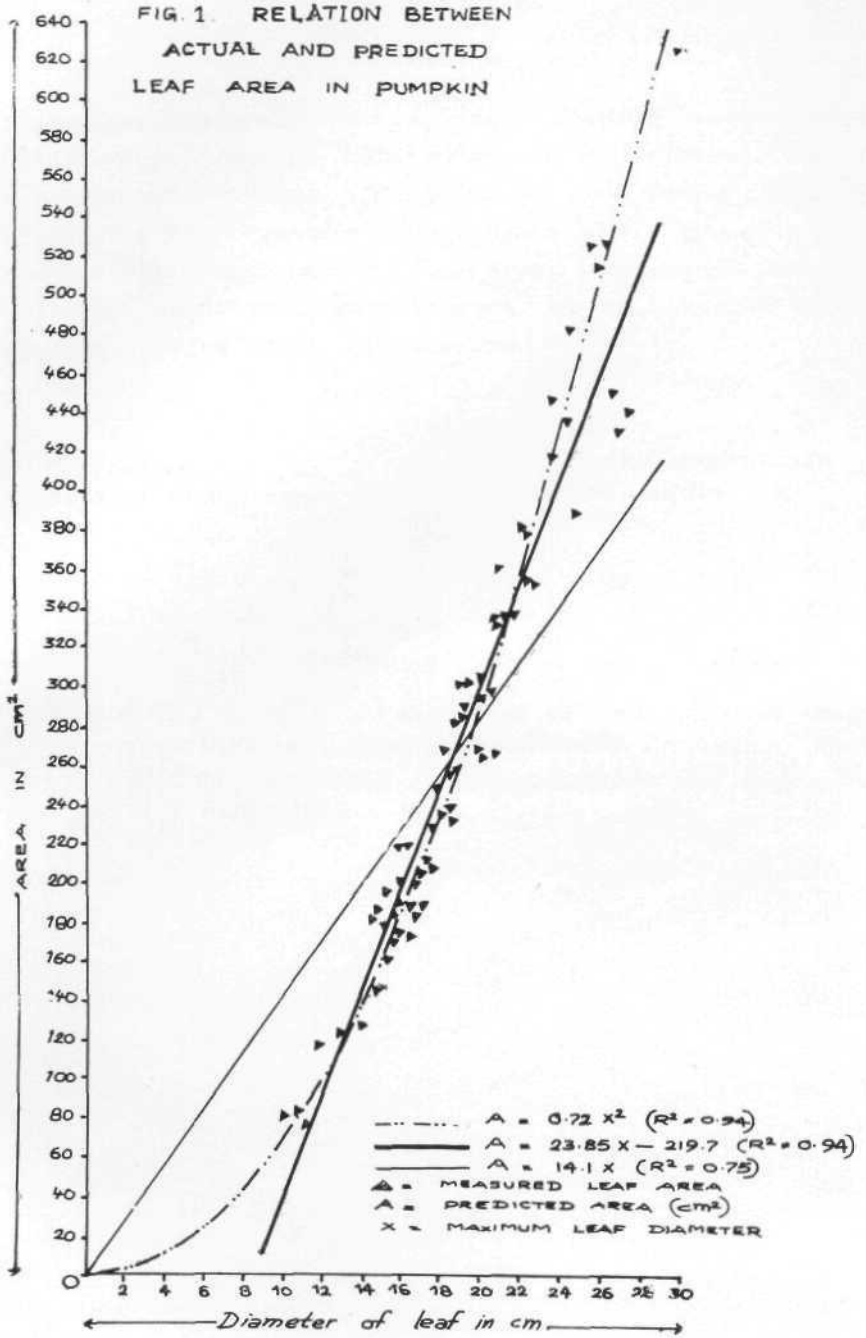
Table 1

Predicted leaf area in pumpkin

Leaf diameter (cm)	Predicted leaf area (cm^2)		
	$A = 25.85x - 219.7$	$A = 0.72x^2$	$A = 14.1x$
0	—	0	0
1	—	0.72	14.10
2	—	2.88	28.20
3	—	6.49	42.30
4	—	11.53	56.40
5	—	18.02	70.50
6	—	25.95	84.60
7	—	35.32	98.70
8	—	46.14	112.80
9	12.95	58,40	126.90
10	38.80	72.10	141.00
11	64.65	87.24	155.10
12	90.50	103.82	169.20
13	116.35	121.84	183.30
14	142.20	141.32	197.40
15	168.05	162.23	211.50
16	193,93	184.58	225.60
17	219.75	208.37	239.70
18	245.60	233.60	253.80
19	271.45	260.28	267.90
20	297.30	288.40	282.00
21	323.15	317,52	296.10
22	349.00	348.48	310.23
23	374.85	380.88	324.30
24	400.70	414.72	338.40
25	426.50	450.00	352.50
26	452.40	450.00	366.60
27	478.25	524.88	380.70
28	504.10	564.48	394.80

A = Predicted leaf area (cm)
X = Measured maximum leaf diameter (cm)

FIG. 1 RELATION BETWEEN ACTUAL AND PREDICTED LEAF AREA IN PUMPKIN



സംഗ്രഹം

ഇലകളുടെ വ്യാസത്തിൽ നിന്ന് മൊത്തം വിസ്തീർണ്ണം കണ്ടുപിടിക്കുന്നതിനു വേണ്ടി CM 14 എന്ന ഇനം ffimw^lroi പരീക്ഷണങ്ങൾ നടത്തുകയുണ്ടായി. ചെടിയുടെ വളർച്ചയുടെ വിവിധ ദശകളിൽ ഇലകൾ പറിച്ചെടുത്ത് അവയുടെ വ്യാസം നിർണ്ണയിച്ചതിൽ, അത് 10 മുതൽ 27,4 സെ മീ. വരെ വ്യത്യാസപ്പെടുന്നതായി കണ്ടു. ഇലകളുടെ വ്യാസം അവയുടെ യഥാർത്ഥ വിസ്തീർണ്ണവുമായി ബന്ധപ്പെടുത്തി മൂന്ന് സമവാക്യങ്ങൾ രൂപീകരിക്കുവാൻ കഴിഞ്ഞു. rerai-oiT^ നിന്നും ഇലയുടെ വ്യാസം അളന്ന് കഴിഞ്ഞാൽ അവയുടെ വിസ്തീർണ്ണം കണ്ടുപിടിക്കാൻ കഴിയും എന്നു തെളിഞ്ഞു.

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