

Research Note

MONTHLY WATER CONSUMPTIVE USE OF PAPAYA AT FOUR REGIONAL SITES IN PUERTO RICO¹

The objective of this study was to estimate monthly water consumptive use (CU, mm) by papaya for four regional sites in Puerto Rico. Temperature and rainfall data², a USDA-SCS computer program³ and information from USDA-SCS Technical Release 21⁴ were used to estimate monthly CU with the following relationship:

$$CU = \frac{Kc \times Kt \times H \times p \times (0.46 \times T + 8.128)}{\text{-----}/1/}$$

where CU = monthly consumptive use with modified Blaney-Criddle model (mm), Kc = crop growth coefficient reflecting growth stage, Kt = a climatic coefficient which is related to mean air temperature, p = monthly percentage of total annual daylight hours, T = mean air temperature (°C) and H = a humid area factor 0.8. Kc values are indicated in table 1. It was assumed that papaya is planted 1 September and first harvest is on the 273rd day after planting. Thereafter, fruits are picked every 30 days till the crop is 24 months old⁵.

The four Agricultural Experiment Substations of the University of Puerto Rico were Fortuna, Gurabo, Isabela and Lajas. These sites correspond to distinct climatic zones of Puerto Rico⁶. Location of these weather stations was described by Goyal et al.⁷. Table 1 indicates monthly CU, from September through August (24-month-old crop), at these four locations.

For 24-month-old papaya, total CU (mm) was 2710 at Fortuna, 2604 at Gurabo, 2521 at Isabela and 2547 at Lajas. During the growing cycle, monthly CU range (mm) was 90 to 134 at Fortuna, 86 to 130 at Gurabo, 84 to 125 at Isabela and 84 to 130 at Lajas. At all locations minimum CU was observed in the 6th month (February) and maximum CU in the 10th month (June). Monthly CU range was 66 to 134 mm for all Puerto Rico. This is equivalent of 2.2 to 4.5 mm/day. For a 24-month period, average daily CU (mm/day) was 3.7 at Fortuna; 3.6 at Gurabo; and 3.5 at Isabela and Lajas. Total, monthly and daily CU are approxi-

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²Climatology of the United States No. 86-45 of Puerto Rico and U.S. Virgin Islands. *In*: Climatic Summary of the US Supplement. United States Dept. of Commerce, Washington, D.C.

³Hackbart, C. A., 1987. Consumptive Use and User's Manual for Puerto Rico. USDA-SCS, Fort Worth-TX.

⁴United States Department of Agriculture-Soil Conservation Service, 1970. Irrigation water requirements. Technical Release 21 by U.S. Govt. Printing Office, Washington, D.C.

⁵Estación Experimental Agrícola, 1987. Conjunto tecnológico para la producción de papaya. Esta. Exp. Agric. Río Piedras, Puerto Rico. Enero de 1987. pagina 1 a 17.

⁶Soil Surveys of Arecibo, Humacao, Mayagüez, Ponce and San Juan Areas of Puerto Rico. USDA-SCS, San Juan, P. R.

⁷Goyal, M. R. and E. A. González, 1988. Net irrigation requirements of plantains for climatic zones of Puerto Rico. *J. Agric. Univ. P. R.* 72 (4): 00.

TABLE 1.—*Monthly consumptive use (CU, mm) of papaya for four climatic zones of Puerto Rico. Date of planting: September 1; last harvest: August 31*

Month	Kc	Monthly consumptive use (CU), mm/month			
		Agricultural Experiment Substations in Puerto Rico			
		Fortuna	Gurabo	Isabela	Lajas
1. September	0.72	103	100	96	97
2. October	0.76	111	107	103	104
3. November	0.80	108	103	100	100
4. December	0.82	104	99	97	95
5. January	0.82	101	96	93	93
6. February	0.82	90	86	84	84
7. March	0.82	106	102	99	99
8. April	0.82	111	107	103	104
9. May	0.82	129	125	120	124
10. June	0.82	134	130	125	130
11. July	0.82	132	127	124	125
12. August	0.82	130	125	121	122
13. September	0.82	118	114	109	111
14. October	0.82	120	115	112	113
15. November	0.82	111	105	103	103
16. December	0.82	104	99	97	95
17. January	0.82	101	96	93	93
18. February	0.82	90	86	84	84
19. March	0.82	106	102	99	99
20. April	0.82	111	107	103	104
21. May	0.80	126	122	117	121
22. June	0.77	126	122	117	122
23. July	0.75	121	116	113	115
24. August	0.74	117	113	109	110
Total, 730 Days		2710	2604	2521	2547
mm/day		3.7	3.6	3.5	3.5

mately the same at Isabela and Lajas because these sites follow similar climatic patterns. Declining order of CU was Fortuna > Gurabo > Lajas > Isabela. Total CU for papaya with different growing cycle can be estimated with average daily CU. For 21-month (640 day)-old papaya, total CU (mm/growing cycle) was 2368 at Fortuna; 2304 at Gurabo; and 2240 at Isabela and Lajas.

These CU are useful in planning irrigation and water management in Puerto Rico. Procedure of how to use these results for

CU with different Kc, net irrigation requirements, gross irrigation requirements was outlined by Goyal²; it is also applicable for papaya with specified management factors.

These CU estimates have not been compared with experimental data. Such experimental data are obtained with lysimeter studies and are not available for Puerto Rico.

Megh R. Goyal
Agricultural Engineer