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A survey of the weed flora in Faba bean (*Vicia faba* L.) in Khartoum State, Sudan

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ABSTRACT: *A weed survey was conducted in six locations in Khartoum area***:** *Elfaki Hashim, Jaziret Wawisti, Jaziret Islang, El Jerafa, Jaziret Tuti and Soba during the winter season of 2015/2016 to determine the most common and prevalent weed species associated with faba bean (Vicia faba L.) crop cultivation and to determine which weed type is dominated in Khartoum State. The data revealed the presence of* **20** *species of annual and perennial weeds belonging to* **13** *families. Of these species 14 were dicotyledonous, 6 were monocotyledonous. The Poaceae, Asteraceae, Solanaceae and Amaranthaceae made up 15%, 10%, 10% and 10% respectively, of the total number of species. The remaining weed species belonged to 9 other families. The results indicated that the weed flora of Khartoum State was dominated by broad leaved weeds. The highest number of species (12) occurred in Soba, followed by Faki Hashim (11) while the lowest (8) was recorded in El Jerafa. C. rotundus, C. dactylon, B. aruciformis, E. colona, and T. terrestris prevailed in all locations. C. rotundus, C. dactylon, B. aruciformis and E. colona, were weeds that occurred at high relative abundance. The species with moderate mean relative abundance were T. terrestris L., G. gynandra, P. oleraceae and S. dubium Fresen. The other species exhibited low mean relative abundance*

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INTRODUCTION:

Faba bean (*V. faba* L.) a Fabaceae, has a number of English names, such as broad bean, field bean, faba bean and horse bean (Mukhtar, 1998). It is one of the fourth most important food legume crops in the world and it is used in different forms. Dry seeds are consumed for long as a source of protein in the human diet and animal feed, and the pods are harvested green for consumption as vegetable. In addition, faba bean contributes to soil fertility through biological nitrogen fixation. It is commonly known in the Sudan as Egyption bean. The main production zones of faba bean in the Sudan are the Northern State (> 70%) and the Nile State (20%) (Mukhtar, 1998; Gamal, 2008, and Bedry and Abbas, 2011).

Until lately, weeds were not a serious constraint to crop production in Khartoum State, Sudan. However, use of uncertified seeds, animal grazing and flooding of the River Nile led to spread of some serious annual weeds (Bedry and Abbas, 2011). Recently, weeds became the main obstacle in crop production in Khartoum State and elsewhere in the Sudan. They reduce yield through direct competition for light, moisture and nutrients and indirectly interfere with the utilization of land and water resources and adversely affect human welfare (Abdalla, 2009; Hamada *et al.*, 2009 and Mukhtar *et al.*, 2018).

The little work of past surveys and information regarding weed status in Khartoum State necessitates undertaking weed surveys to generate information on weed species, then density and distribution of weeds. The generated data help in understanding the size and extent of the problems that may arise due to weeds and in developing management practices. A weed survey methods have been introduced by many scientists. The method used by Thomas (1985) is more effective in determining the relative abundance of each species in the community (Moeini *et al*., 2008). A weed survey was, therefore, conducted in six locations in Khartoum State to determine the most common and prevalent weed species associated with faba bean crop and to determine which weed type is dominated in Khartoum State.

MATERIALS and METHODS:

A weed survey was conducted in Khartoum State in the winter season 2015/2016. The area is located within Latitude 15° 40 N, and Longitude 32° 23 E) (Babiker *et al*., 2015). Most of Khartoum State is located in the region climatic semi-desert, while Northern areas are located in the desert areas and the climatic of the state is hot to very hot and raining summers and warm and cool, dry winters, rainfall average 200-300 ml, temperature ranging in the summer season between 25-40 degrees, temperature drop in the winter season among the months of November to March and ranging between 15-25 degrees (Ahmed, 2016). A weed survey was undertaken in farmers' fields in six locations: El Faki Hashim, Jaziret Wawisti, Jaziret Islang, El Jerafa, Jaziret Tuti and Soba (each more than 50 feddan) (one fed. = 0.42 ha), four weeks after faba bean sowing. This period coincided with maximum growth of weeds and ease of their identification in these locations. Counts at this time may indicate the size and extent of weed populations. The survey was undertaken using commonly accepted botanical survey methods to locate and identify weeds present in the areas. The survey methods involved searching, identifying and counting different weed species.

A stratified random sampling procedure, described by Thomas (1985), Mohamed and Mohamed (1992) and Moeini *et al*. (2008), was adopted. The surveyed area in each location was divided into fields, of which 10 were randomly selected.
The number of individual weed species was determined in 10 quadrates each 1 m^2.

The data were processed to indicate the distribution, density (D) was the number of individuals of species per square meter. The mean field density (MFD) was the total of each field density, expressed as a percentage of the total number of fields. Field frequency (FR) was the number of fields in which species occurred, expressed as a percentage of the total number of fields. Field uniformity (FU) was the number of sampling locations in which species occurred, expressed as a percentage of the total number of samples. Relative mean field density (RMFD) value for species was the mean field density value for species, expressed as a percentage of summation of mean field density values for all species. Relative field frequency (RFR) for species was the frequency value for species, expressed as a percentage of summation of frequency values for all species. Relative field uniformity (RFU) for species was field uniformity value for species, expressed as a percentage of summation of field uniformity values for all species. Relative abundance for species (RA) was the total number of relative mean field density for species, relative field frequency for species and relative field uniformity for species as follow:-

Density (D) = number of individuals of a certain species (K)/m^2.

$$\text{Mean field density (MFD)} = \frac{\text{Total of each field density} \times 100}{\text{Total number of fields}}$$

$$\text{Field frequency (FR)} = \frac{\text{Number of fields in which species (K) occurs} \times 100}{\text{Total number of fields}}$$

$$\text{Field uniformity (FU)} = \frac{\text{Number of sampling locations in which species (K) occurs} \times 100}{\text{Total number of samples}}$$

$$\text{Relative mean field density for species K } (RMFD_K) = \frac{\text{Mean field density value for species K}}{\text{Sum of mean field density values for all species}} \times 100$$

$$\text{Relative field frequency for species K } (RFR_K) = \frac{\text{Field frequency value for species K}}{\text{Sum of field frequency values for all species}} \times 100$$

$$\text{Relative field uniformity for species K } (RFU_K) = \frac{\text{Field uniformity value for species K}}{\text{Sum of field uniformity values for all species}} \times 100$$

$$\text{Relative abundance for species K } (RA_K) = RMFD_K + RFR_K + RFU_K$$

(Thomas 1985; Mohamed and Mohamed 1992 and Moeini *et al*.2008).

RESULTS and DISCUSSION:

The data revealed the presence of 20 species of annual and perennial weeds belonging to 13 families (Table 1). Of these species 14 were dicotyledonous and 6 were monocotyledonous. The Poaceae, Asteraceae, Solanaceae and Amaranthaceae made up15 %, 10 %, 10 % and 10 % respectively, of the total number of species. The remaining weed species belonged to 9 other families (Table1). Of the 20 recorded species, 8 species (denoted by * in Table 1) occurred in one or two areas at very low density (less than 1 plant / m^2) and were not considered in the analysis and presentation of the result (Table1). The results indicated that, the weed flora of Khartoum State was dominated by broad leaved weeds. The same result was found by Safia, (2007). This result could be attributed to the use of graminae weed herbicides such as Topic, Topnour and Traxos by farmers more than broad leaved weed herbicides, such as 2.4 – D. It could also be attributed to the variation of soils types of arable crops, the forming system of edaphic factors and because the broad leaved weeds are few preference for feeding by animals than graminae weeds.

The highest number of species (12) occurred in Soba, followed by El Faki Hashim (11) while the lowest (8) was recorded in El Jerafa. *C. rotundus, C. dactylon, B. aruciformis, E. colona* and *T. terrestris* prevailed in all areas (Table 2). This could be attributed to the perennial life cycle of *C. rotundus* and *C. dactylon* which propagate sexually by seeds and asexually by vegetative organs. These characteristics make their control very difficult, more over they can germinate in tropical and subtropical areas and in different types of soils. *B. aruciformis, E. colona and T. terrestris* are annual weed species which propagate sexually by seeds in tropic and subtropic climates. Seeds of these weed species are very difficult to separate from seeds of various crops, and so they have been sown and harvested along with the crops. In addition these weed species disseminate their seeds by animals, fodders, farm equipment, farm products, wind, water, birds, organic manure, human being and various transport means which translocate seeds of various crops which mixed with seeds of weeds from place to another or from country to another.

C. rotundas had highest mean field density (MFD) (72.9) than any of the other species (Table 2). It was followed in descending order by *C. dactylon* L., *B. eruciformis, E. colona, T. terrestris L., G. gynandra , P. oleracea L., S. dubium Fresen*, and *A. viridis* L. which attained a MFD of 29.8, 29.7, 26.3, 18.1, 15.5, 11.6, 11.1 and 10.3. Other species exhibited a MFD of less than 7.0 (Table2). This result could be attributed to the variation of soils types of arable crops, the forming system of edaphic factors.

Field frequency (FR) of individual species indicated that *C. rotundas* and *C. dactylon,* were the most frequent species (100 %) (Table 3). It was followed by *B. aruciformis, E. colona, T. terrestris L., D. stramonium, X. basilicum, G. gynandra* and *P. oleraceae,* which had a FR of 95.4 % - 51.0 %. Other weed species were of low FR level (less than 34.0 %) (Table 3).

The maximum field uniformity (FU) (89.2 %) was achieved by *C. rotundus* (table 4). it was followed in descending order by *C. dactylon, B. aruciformis, E. colona, G. gynandra, **P**. oleraceae* and *S. dubium* Fresen, which demonstrated a FU of 70.0 % - 29.2 %. Other weed species attained low FU (less than 18.0 %) (Table 4). This result could be attributed to: *C. rotundus and C. dactylon* are perennials which combine the advantages of both systems, fast and extensive spread through sexually produced seeds plus firm establishment on the site through vegetative organs which store considerable food reserves for spread and regeneration. The above mention characteristics make their control by traditional methods or herbicides difficult and accordingly displayed high FR and FU. On the other hand, *B. aruciformis* and *E. colona* are annuals which propagate sexually by seeds in tropical and subtropical climates. Seeds of these species are difficult to separate from grains of cereals or seeds of crops, and so they have been sown and harvested along with the crops. Also these weeds disseminate their seeds by wild and domesticated animals, farm equipment, farm products, dodders, wind, water, birds and stable manure before decomposition which is a very common source of weed dissemination.

C. rotundus had higher relative mean field density (31.6%) than any of the other weed species (Table 5). It was followed in a descending order, by, *C. dactylon, B. aruciformis, E.colona, T. terrestris L.* and *G. gynandra,* which attained a RMFD of 12.7 % - 6.1 %. Other weed species displayed a RMFD of less than 5 % (Table 5).

Relative field frequency (RFR) of individual species showed that, *C. rotundus* and *C. dactylon,* were the most frequent species (13.0 %) (Table 6). It was followed by *B. aruciformis, T. terrestris L., E. colona, D.stramonium, X. basilicum, G. gynandra* and *P. oleraceae,* which demonstrated a RFR of 12.4 % - 6.5 %. Other species exhibited a RMFD less than 5 % (Table 6).

The maximum relative field uniformity (RFU) (22.4 %) was achieved by *C. rotundus* (Table 7). It was followed, in descending order, by *C. dactylon, B. aruciformis, E. colona, G. gynandra, P. oleraceae, S. dubium Fresen* and *T. terrestris L* which displayed a FRU of 16.7 % - 4.2 %. Other weed species displayed a RFU of less than 4 % (Table 7). This result could be attributed to: *C. rotundus and C. dactylon* are perennials which combine the advantages of both systems, fast and extensive spread through sexually produced seeds plus firm establishment on the site through vegetative organs which store considerable food reserves for spread and regeneration. The above mention characteristics make their control by traditional methods or herbicides difficult and accordingly displayed high RFD, RFR and RFU. On the other hand, *B. aruciformis, E. colona* and *T. terrestris* are annuals which propagate sexually by seeds in tropical and subtropical climates. Seeds of these species are difficult to separate from grains of cereals or seeds of crops, and so they have been sown and harvested along with the crops. Also these weeds disseminate their seeds by several means such as animals, farm equipment, farm products, dodders and wind,.

C. rotundus had higher relative abundance (RA) (66.9 %) than any of the other species (Table 8). It was followed, in a descending order, by *C. dactylon, B. aruciformis, E. colona, T. terrestris L., G. gynandra, P. oleraceae* and *S. dubium Fresen* which attained a RA of 42.3 % - 15.1%. Other species exhibited low RA of less than 12 % (Table 8).

The important feature of this survey is the method of ranking species on their mean relative abundance. The survey system provided quantitative comparison of the common species.

C. rotundus, C. dactylon, B. aruciformis and *E. colona,* ranked high in the survey. *C. rotundus and C. dactylon* are perennials which combine the advantages of both systems, fast and extensive spread through sexually produced seeds plus firm establishment on the site through vegetative organs which store considerable food reserves for spread and regeneration. The above mention characteristics make their control by hand weeding or herbicides means difficult and accordingly displayed high MFD, FR and FU. On the other hand, *B. aruciformis* and *E. colona* are annuals which propagate sexually by seeds in tropical and subtropical climates. Seeds of these species are difficult to separate from grains of cereals or seeds of crops, and so they have been sown and harvested along with the crops. Also these weeds disseminate their seeds by wild and domesticated animals, farm equipment, farm products, dodders, wind, water, birds and stable manure before decomposition which is a very common source of weed dissemination. The species with moderate mean relative abundance were *T. terrestris L., G. gynandra, P. oleraceae* and *S. dubium Fresen.* The other species exhibited low mean relative abundance (Table 8).

Table 1: Scientific, English, Arabic names and family name of some weed species:

Scientific name	English name	Arabic name	Family name
Cyperus rotundusl L..	Purple nutsedge	Seida	Cyperaceae
Cynodon dactylon L.	Bermuda grass	Nageel	Poaceae
Brachiaria eruciformis	Sweet signal grass	Um kwiaat	Poaceae
Echinochloa colona (L.) Link.	Barnyard grass	Defra	Poaceae
Gynandropsis gynandra L.Bri q	Caffir Cabbage	Tamaleka	Capparidaceae
Sonchus oleraceusL	Sow thistle	Moleita	Asteraceae
Tribulus terrestris L	Caltrops	Dereisa	Zygophyllaceae
Portulaca oleracea L.	Purslane	Rigla	Portulacaceae
Xanthium brasilicumVell	Rough or Heart leaf cocklebur	Ramtuk	Asteraceae
Datura stramonium L.	Thorn apple	Datura	Solanaceae
*Amaranthus viridis*L.	Pigweed	Lisan tair kabir	Amaranthaceae
Solanum dubium Fresen.	Poison berry	Gubbein	Solanaceae
*Imperata cylindrica (L.) Raeuschel**	Cogon grass	Halfazailelgit	Poaceae
*Orobanche crenata Forssk.**	Broomrape	Halouk	Orobanchaceae
*Eruca sativa M Ill.**	Rocket	Girgeer	Cruciferae
Tephrosia apollinea (Del) DC*	Wild sweet pea	Amayouga	Fabaceae
*Cuscuta campestris L.**	Dodder	Hamool	Cuscutacee
*Sorghum arundinaceum. (Dew.) Stapf**	*Wild Sorghum*	Adar	Poaceae
*Amaranthus graecizans L.**	White pigweed	Lisan tair saghir	Amaranthaceae
*Abutilon pannosum L.**	Ragged mallow	Hambouk	Malvaceae

* occurred in one or two locations at very low density (0.78-0.8)

Table 2: mean field density of common weed species:

Mean	JT	S	J	JI	JW	FH	Name of species
72.9	60.0	71.7	90.3	75.7	70.0	9.76	*C. rotundus* ***L.***
29.8	21.3	36.3	41.0	24.0	23.7	.033	*C. dactylon* L.
29.7	23.7	36.0	26.0	18.0	25.3	49.3	*B. eruciformis*
26.3	12.6	13.0	10.7	14.3	73.3	33.7	*E. colona* L.
18.1	12.7	16.3	15.7	28.0	19.0	16.7	*T. terrestris L.*
15.5	16.3	31.0	0.0	0.0	19.0	26.7	*G. gynandra*
11.6	11.0	10.3	0.0	9.3	22.0	6.71	*P. oleracea L.*
11.1	0.0	11.0	9.3	11.0	11.0	4.02	*S. dubium Fresen.*
10.3	12.0	24.0	12.7	0.0	0.0	13.0	*A. viridis* L.
6.4	8.6	10.3	19.7	0.0	0.0	00.0	*S. oleraceous* L.
4.0	0.7	6.7	0.0	4.3	1.3	11.0	*D. stramonium L.*
2.5	0.0	2.3	0.0	5.0	4.0	3.7	*X. brasilicum Vel*

FH: El Faki Hashim Jw: Jaziret Wawisti , JI: Jaziret Islang, J: El Jerafa, S: Soba, JT: Jaziret Tuti

Table 3: percentage of field frequency (FR) of common weed specie

Mean	JT	S	J	JI	JW	FH	Scientific name
100	100	100	100	100	100	100	*C. rotundus* ***L.***
100	100	100	100	100	100	100	*C. dactylon* L.
95.4	100	100	72.6	100	100	100	*B. eruciformis*
79.8	66.6	100	45.3	100	100	66.6	*E. colona* L.
79.7	100	66.6	100	60.6	78.6	72.6	*T. terrestris L.*
61.1	0.0	100	100	66.6	33.3	66.6	*D. stramonium L.*
61.1	0.0	100	33.3	100	66.6	66.6	*X. brasilicum Vel*
51	39.3	39.3	60.6	39.3	27.3	100	*G. gynandra*
51	30.3	45.3	100	63.6	66.6	0.0	*P. oleracea L.*
33.3	66.6	0.0	33.3	0.0	0.0	100	*S. oleraceous* L.
31.4	0.0	27.3	0.0	41.3	76.6	43.3	*S. dubium Fresen.*
28.3	0.0	33.3	33.3	33.3	66.6	3.3	*A. viridis L.*

FH: El Faki Hashim Jw: Jaziret Wawisti , JI:Jaziret Islang, J: El Jerafa, S: Soba, JT: Jaziret Tuti

Table 4: percentage of field uniformity (FU) of common weed species:

Mean	JT	S	J	JI	JW	FH	Scientific name
89.2	100	100	100	95	85	55	*C. rotundus* ***L.***
70	40	75	60	70	80	95	*C. dactylon* L.
55	25	60	35	90	40	80	*B. eruciformis*
43.3	35	40	15	45	85	40	*E. colona* L.
35	45	35	80	0.0	0.0	50	*G. gynandra*
30	20	40	20	25	40	35	*P. oleracea L.*
29.2	10	60	20	40	20	25	*S. dubium Fresen.*
17.5	0.0	5	50	0.0	15	35	*T. terrestris L.*
15	10	0.0	0.0	40	25	15	*A. viridis L.*
10.8	0.0	0.0	0.0	15	10	40	*D. stramonium L.*
10	15	10	0.0	0.0	15	20	*S. oleraceous* L.
9.2	15	0.0	0.0	20	15	5	*X. brasilicum Vel*

FH: El Faki Hashim Jw: Jaziret Wawisti , JI: Jaziret Islang, J: El Jerafa, S: Soba, JT: Jaziret Tuti

Table 5: Percentage of relative mean field density (RMFD) of common weed species:

Mean	JT	S	J	JI	JW	FH	Scientific name
31.6	33.5	26.7	40.1	39.9	26.1	23.4	*C. rotundus* ***L.***
12.7	11.9	13.5	18.2	12.7	8.8	11.1	*C. dactylon* L.
12.3	13.2	13.4	11.5	9.5	9.4	16.6	*B. eruciformis*
10.5	7.0	4.8	4.8	7.5	27.3	11.3	*E. colona* L.
8.0	7.1	6.1	7.0	14.8	7.1	5.6	*T. terrestris L. 0*
6.1	9.1	11.5	0.0	0.0	7.1	9.0	*G. gynandra*
4.8	6.1	3.8	0.0	4.9	8.2	5.6	*P. oleracea L.*
4.4	0.0	4.1	4.1	5.8	4.1	8.1	*S. dubium Fresen.*
4.3	6.7	8.9	5.6	0.0	0.0	4.4	*A. viridis L.*
2.9	4.8	3.8	8.7	0.0	0.0	0.0	*S. oleraceous* L.
1.6	0.4	2.5	0.0	2.3	0.5	3.7	*D. stramonium L.*
1.0	0.0	0.9	0.0	2.6	1.5	1.2	X. brasilicum *Vel*

FH: El Faki Hashim Jw: Jaziret Wawisti , JI: Jaziret Islang, J: El Jerafa, S: Soba, JT: Jaziret Tuti

Table 6: Percentage of relative field frequency (RFF) of common weed species:

Mean	JT	S	J	JI	JW	FH	Scientific name
13.0	16.6	11.4	12.9	12.4	12.3	12.2	*C. rotundus* ***L.***
13.0	16.6	11.4	12.9	12.4	12.3	12.2	*C. dactylon* L.
12.4	16.6	11.4	9.3	12.4	12.3	12.2	*B. eruciformis*
10.5	16.6	7.6	12.9	7.5	9.6	8.9	*T. terrestris L.*
10.2	11.1	11.4	5.8	12.4	12.3	8.1	*E. colona* L.
7.5	0.0	11.4	12.9	8.3	4.1	8.1	*D. stramonium L.*
7.4	0.0	11.4	4.3	12.4	8.2	8.1	*X. brasilicum Vel*
6.6	6.5	4.5	7.8	4.9	3.4	12.2	*G. gynandra*
6.5	5.0	5.2	12.9	7.9	8.2	0.0	*P. oleracea L.*
4.6	11.1	0.0	4.3	0.0	0.0	12.2	*S. oleraceous* L.
3.8	0.0	3.1	0.0	5.1	9.4	5.3	*S. dubium Fresen.*
3.5	0.0	3.8	4.3	4.1	8.2	0.4	*A. viridis L.*

FH: El Faki Hashim Jw: Jaziret Wawisti , JI: Jaziret Islang, J: El Jerafa, S: Soba, JT: Jaziret Tuti

Table 7: percentage of relative field uniformity (RFU) of common weed species:

Mean	JT	S	J	JI	JW	FH	Scientific name
22.4	31.8	23.5	26.3	21.6	19.8	11.1	*C. rotundus* ***L.***
16.7	12.7	17.7	15.8	15.9	18.6	19.2	*C. dactylon* L.
12.9	7.9	14.1	9.2	20.5	9.3	16.2	*B. eruciformis*
10.4	11.1	9.4	4.0	10.2	19.8	8.1	*E. colona* L.
9.0	14.3	8.2	21.1	0.0	0.0	10.1	*G. gynandra*
7.2	6.4	9.4	5.3	5.7	9.3	7.1	*P. oleracea L.*
6.9	3.2	14.1	5.3	9.1	4.7	5.1	*S. dubium Fresen.*
4.2	0.0	1.2	13.2	0.0	3.5	7.1	*T. terrestris L.*
3.5	3.2	0.0	0.0	9.1	5.8	3.0	*A. viridis L.*
2.5	4.8	2.4	0.0	0.0	3.5	4.0	*S. oleraceous* L.
2.3	0.0	0.0	0.0	3.4	2.3	8.1	*D. stramonium L.*
2.3	4.8	0.0	0.0	4.6	3.5	1.0	X. brasilicum *Vel*

FH: El Faki Hashim Jw: Jaziret Wawisti , JI: Jaziret Islang, J: El Jerafa, S: Soba, JT: Jaziret Tut

Table 8: percentage of relative abundance (RA) of common weed species:

Mean	JT	S	J	JI	JW	FH	Scientific name
66.9	81.9	61.6	79.3	73.9	58.2	46.7	C. rotundus L.
42.3	41.2	42.6	46.9	41.0	39.7	42.5	C. dactylon L.
37.5	37.7	38.9	30.0	42.4	31.0	45.0	B. eruciformis
31.1	29.2	25.6	14.6	30.1	59.4	27.5	E. colona L.
22.6	23.7	14.9	33.1	22.3	20.2	21.6	T. terrestris L.
21.6	29.9	24.2	28.9	4.9	10.5	31.3	G. gynandra
18.5	17.5	18.4	18.2	18.5	25.7	12.7	P. oleracea L.
15.1	3.2	21.3	9.4	20.0	18.2	18.5	*S. dubium Fresen.*
11.3	9.9	12.7	9.9	13.2	14.0	7.8	*A. viridis L.*
11.3	0.4	13.9	12.9	14.0	6.9	19.9	D. stramonium L.
10.8	4.8	12.3	4.3	19.6	13.2	10.3	X. brasilicum Vel
9.9	20.7	6.2	13.0	0.0	3.5	16.2	S. oleraceous L.

FH: El Faki Hashim Jw: Jaziret Wawisti , JI: Jaziret Islang, J: El Jerafa, S: Soba, JT: Jaziret Tuti

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