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POPULATION DENSITIES AND BIOMASS OF ABOVE-GROUND ARTHROPODS SUBJECTED TO ENVIRONMENTAL STRESS TREATMENTS ON THE PAWNEE SITE, 1973

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ABSTRACT

A study of the effects of applications of water, nitrogen and water plus nitrogen on the density and biomass of insects of the Pawnee National Grasslands, was continued during 1973. Those replicated plots receiving both water and nitrogen consistently contained greater numbers of insects which had a greater biomass. Those plots receiving water alone contained somewhat lesser numbers and biomass. There were few differences apparent between the control plots and those receiving nitrogen alone. Both contained considerably less insects than those plots receiving water treatments. The insects collected from the plots, using a D-vac suction apparatus, were subjected to trophic analysis, (ie., catorgorized according to feeding habit) to determine if there were differential responses to the environmental stress treatments by insects representing the different trophic levels: (1) plant sap feeding, (2) plant tissue feeding, (3) onmivores, (4) predators, (5) scavengers and (6) parasites. Plant sap feeding insects and plant tissue feeders responded positively to the water and water plus nitrogen treatments by increasing in both numbers and biomass, with little difference shown between these two treatments. Predatory insects, in both density and biomass, showed greatest increases in the plots treated with water plus nitrogen. This would seem to indicate that food nutrients are passed up the food chain and that certain predators are able to discriminate between food choices. Arthropod omnivores showed their greatest increases in the water only plots; however large numbers were present on two dates only (May 25 and August 16), suggesting that these insects may be migratory. Despite the fact that those plots treated with water contained the greatest amount of litter, there were not significant differences in numbers and biomass of

the so-called scavenger insects collected from any of the plots. This would seem to suggest that litter breakdown is accomplished by organisms other than insects or that the D-vac sampler does not adequately sample these insects.

METHODS, MATERIALS AND SAMPLING DESIGN

FOR ABOVEGROUND INSECT SAMPLING

Sampling

The sampling procedure for aboveground insects in 1973 at the Pawnee Site, was essentially that of 1971 and 1972 (Lavigne et al., 1972 and in preparation) except that only the Environmental Stress Areas (ESA) plots were sampled. The frequency of sampling was essentially the same as was carried out on these plots the previous year. Samples were taken on 9 dates, one of these being on December 7, to ascertain whether the treatment effects were carried over into the winter hibernation period.

The basic objective of the sampling schedule for the season was to sample a sufficient number of times so that the effect of various artifically applied environmental stresses on insect population changes could be appraised. Additionally, it was desired to determine the effect of these stresses on various insect trophic groups. In this connection, a more realistic trophic catagorization was assigned to each species of organism collected, based in part on increased knowledge of their feeding habits on the Pawnee Grasslands and in part on a more thorough search of the literature. This information was accumulated with the aid of Dr. Robin Andrews, an ecological entomologist at the Natural Resource Ecology Laboratory.

The treatments sampled were four in number, as follows:

D - Control

E - Irrigated

F - Fertilized (nitrogen)

G - Irrigated plus fertilized (water plus nitrogen)

The plots were located approximately one half mile west of the Pawnee Site Headquarters building. They had been subjected to the same treatments the previous two years. (Fig. 1). For a more complete description of the treatments see Lauenroth and Sims (1973). Each treatment was replicated twice, with five samples taken per replicate on each sample date.

On all treatments macroplots of 0.5 to 1.0 ha were laid out and a grid system set up within them. The sample points within the grid were selected by means of a random numbers' table. Once a particular point had been sampled, it was eliminated from further sampling. If all points within a grid were eventually sampled, then repeat sampling would begin. Actually, only the grid point was repeated with the actual sample taken adjacent to the original one. Repeat sampling was done only on the two replicates of Treatment 1. The sampling locations on all treatments is illustrated in Fig. 1.

The basic method of field collection of the samples was essentially the same as in 1970, 1971 and 1972, i.e., a 0.5-m^2 circular trap with a 16-mesh screen was dropped by means of a two-wheeled cart fitted with an 18-ft boom, and the insects were collected from within the trap. The collection methods were constant across all treatments. We are indebted to Mr. John Leetham and his fine crew for collecting the samples and doing the initial processing of the samples by the Berlese Funnel Method.

In 1973 the vegetation was accurately recorded within the trap after it was dropped. The plants were recorded by species, estimated field weight, and phenology. This information was recorded in hopes that insect-plant host associations could later be determined.

Following the herbage estimation, the trap contents were vacuumed in two stages. The first-stage vacuum was a "once-over'lightly" design to capture the more active insects and retain as little refuse as possible. The second-stage vacuum was designed to take all plant material and litter down to ground level. All tall vegetation was clipped prior to vacuuming.

Once in the laboratory, the first-stage vacuum samples were frozen to kill all insects. The samples were then transferred to plastic vials for shipment to the University of Wyoming Entomology Department for hand sorting. The second stage vacuum samples were put in Berlese funnels to extract the insects by driving them out of the plant refuse with heat and light. The funnels were 14 inches in diameter and fitted with 25 watt light bulbs for heat. All samples were left in the funnels for a minimum of 48 hr or until the contents were thoroughly dry. The extracted insects were then sent to the University of Wyoming for sorting and identification.

At Wyoming, the Berlese samples were hand-sorted. All the organisms thus collected were preserved in vials. The identification was mainly carried up to family level in the University of Wyoming Entomology Department. For further identification, representative samples of the organisms were sent to specialists throughout the United States. Occasionally, identifications were not possible to the species level, or even higher taxa. All such identifications are included in a technical report by Kumar et al. (1972).

Biomass was determined according to the method described by French (1970) in which, prior to weighing, all samples were dried in an oven at 70°C for 24 hr. Each sample was weighed on a balance with a precision of 10^{-5}g.

Status of Samples

At the time this report was written, all samples received from the Pawnee Site had been processed, the information was transmitted to the National Resource Ecology Laboratory where it was keypunched for insertion in the computer, and analysis was completed and corrections made by June, 1974. We are indebted to Miss Vicki Keith of the Natural Resource Ecology Laboratory for adding our corrections to the data and for running the data through the computor for analysis.

Trophic analysis was based on the following food habit classification which was modified after Evans and Murdoch (1968) and McDaniel (1971):

1. Plant tissue feeder - feeding only on various parts of the plants, including blossoms, using chewing mouthparts.
2. Plant sap feeder - feeding on various parts of plants through the use of sucking mouthparts, excluding nectar feeders.
3. Pollen feeder - confined to feeding on pollen in some stage of growth.
4. Plant seed feeder - feeding on seeds using chewing or sucking mouth parts.
5. Entomophagous predator - feeding largely or exclusively on other insects.
6. Entomophagous parasite - as larvae feeding and destorying only one insect usually from within.
7. Omnivore - feeding on both plant and animal tissue.
8. Scavenger - feeding on dead and decomposing matter, both plant and animal.

ENVIRONMENTAL STRESS TREATMENT SAMPLING (ESA)

Comparison of Arthropod Populations (Density and Biomass)

Samples of aboveground insects were collected from the environmentally stressed plots (ESA) on nine (9) sampling dates during the period May 15, and December 7, 1973. Eight of these sampling dates fell within the growing season for grassland flora. The insects were collected using the previously described D-vac suction apparatus (see Methods Section).

The data presenting mean numbers of aboveground arthropods collected per square meter are given in Tables 1 through 9. That referring to mean biomass of aboveground arthropods collected per square meter are presented in Tables 19 through 27. In these tables, the organisms are listed in major classification groupings; by Order in the case of insects.

A comparison of the total numbers of arthropods collected on each sample date for each stress treatment appears at the bottom of the individual Table. This same data is presented graphically in Figure 2.

Insufficient numbers, within the following major groups, were present to allow trends to be exhibited (Collembola, Neuroptera, Siphonaptera, Procoptera and Chelonethida). The reasons for the apparent absence of grasshoppers (Orthoptera) have been discussed in Tech. Rept. No. 204 (p. 178-180). Trends in the other major groups are discussed below. It should be noted that in all cases, numbers of samples taken were insufficient

according to computer analysis. Consequently, the data has not been subjected to statistical analysis.

Araneida: Members of this group (spiders) are predators and can be expected to be most numerous in the environments containing the most potential prey. Consequently, it comes as no surprise to find the majority of spiders in the water plus nitrogen treatment, followed by the water treatment since this is where the majority of arthropods exist (Fig. 2). This trend continues throughout the season. The considerably more dense populations occurring in the water plus nitrogen treatment (over the water treatment) may also reflect the denseness of the vegetation which provides greater numbers of perching and/or hiding places for spiders. Biomass figures (Tables 19-27) reflect the numerical data.

Acarina: As in previous years, mites responded best numerically to the water and water plus nitrogen treatments. It should be pointed out that the D-vac sampler is not a good method for sampling mites. This has been recognized and 2" soil cores containing litter are currently being taken on the various stress plots. These are being processed in a specially constructed Berlese sampling apparatus in which the mites are extracted for counting (J. K. Leetham, in preparation).

Hemiptera: Members of this group on the stress plots are primarily plant sap sucking insects, although a few are known predators. Fourteen families representing this Order appeared in the samples (Tables 10-19). As can be seen in Tables 1 and 2, there is no apparent relation between stress and populations, whereas in Tables 3 through 9, a definite numerical ascendency occurs in the water and water plus nitrogen plots.

The occurence of high precipitation during May would tend to equalize the effect of water on all plots thus providing a sufficient supply of sap to these insects at any location. It is only later in the season when water becomes scarce, that the effect of the water treatments becomes apparent. The data shows that the combination of water plus nitrogen is almost 3 times as effective in providing support for these insects as is water alone, on most sampling dates. As in previous years, the Lygaeidae, primarily *Blissus leucopterus* (Say), were the dominant Hemiptera in the plots, their numbers reflecting the population differences found in the whole Order Hemiptera. *Nysius* sp. and *Crophius disconotus* (Say) also occurred in relatively large numbers, but there was no decided preference for particular plots, although *Nysius* sp. were more abundant in the water plus nitrogen plots on many dates. Biomass figures (Tables 19-27) reflect the numerical values in the case of the Hemiptera.

Homoptera: In the stress plots, only 7 families representing this order, were collected. As in previous years, the Cicadellidae (leafhoppers) were numerically the best represented group, exceeding other groups by at least four times. In every collection, except the first, the water and water plus nitrogen plots proved to be more attractive to leafhoppers. In the latter part of the season, the influence of the water plus nitrogen combination became apparent, with twice as many leafhoppers occurring in these plots as occurred in the water only plots. While 19 species were represented in the collections, only 7 species occurred in sufficient numbers to be examined for the effect of stress. Of these *Flexamia flexulosa* (Ball) showed the greatest numerical response to the water and water plus nitrogen plots, reaching population levels of over

160/m^2 in early July. The other species, *Ceratagallia* sp., *Athysanella* sp., *Cuerna septrionalis* (Walker), *Gillettiella labiata* (Gillette), *Xerophloea peltata* (Uhler) and *Frigartus frigidus* (Ball) also exhibited a positive response to these treatments but usually occurred in numbers less than 30/m^2.

Aphids, represented by (less than 3/m^2) were present only in small numbers and then only intermittently. Because of their propensity for colonization on individual plants, and the small number of samples taken, it is not surprising that aphids were missed, although on the basis of random chance, one would expect at least one sample to contain large numbers. It is quite possible that being soft bodied insects, the effect of the vacuum is to crush them as they are drawn into the trap initially. Thus they are too weak to avoid the effect of the heat lamp and thus do not reach the alcohol.

Bruchomorpha suturalis Melichar (Issidae) was consistently present in all plots from mid-June onwards. Its numbers did not exceed 3/m^2 and no response was shown to any treatment. Only an occasional Psyllidae and Pseudococcidae were picked up by the D-vac apparatus in 1973. The Cercopid, *Philaronia blilineata* (Say) appeared only in the samples taken from the water treated plots (E & G).

Thysanoptera: Thrips are tiny insects which are commonly found in the developing seed heads of grasses and in the flowers of rangeland forbs and shrubs. The majority of thrips appeared in the samples in the early part of the season, May 15 - June 13, as would be expected since this is the time when most grasses are heading out and the majority of forbs are in bloom. It is expected that because of their minute size, many thrips escape through the mesh of the organdy bags used to transport the insects

to the laboratory. However, on the first three sample dates, the water plus nitrogen plots contained the majority of Thysanoptera. The biomass of these insects is insignificant.

Lepidoptera: The great mass of lepidopterous specimens collected were in the larval stage. Several families were represented, including Noctuidae, Arctiidae, Geometridae, Pyralidae, Psychodidae, and Gelechidae.

There was an unexpected occurrence of an unknown larva (#105) in exceptionally large numbers in the water only plots, exceeding 300/m^2 on both the May 25 and June 14 sampling dates. This species accounted for over 50 percent of the larvae collected. Larvae were present from May 25 - July 5 and again appeared in the samples on October 8 and December 7 indicating that this species overwinters in the larval stage.

The Arctiid, *Apantesis blakei* Grote was notable for its almost complete absence from the samples this season.

Hymenoptera: Interestingly, the greatest numbers of Hymenoptera were in the water only plots rather than in those treated with water plus nitrogen. While 9 families of Hymenoptera were picked up in the D-vac samples, the Formicidae (ants) again dominated in the samples.

The usual species of *Formica*, *Monomorium*, *Myrmica* and *Solenopsis* were present, and as in previous years no western harvester ants were collected by the D-vac sampler. The large number of ants in the water only plots, ranging from 82.8 to 347.4/m^2, on May 25, July 25 and August 16 were undoubtedly the result of concentrations of these ants, *Solenopsis molesta validiuscula* Emery on some flowering forbs. The other species which occurred in relatively large numbers was *Monomorium minimum* (Buckley). This species exhibited an avoidance for the water plus nitrogen plots, as did

S. molesta. Presumably the reduced numbers of ants in the water plus nitrogen plots resulted from the more dense or more stimulated root growth. Despite the presence of western harvester ant colonies in the plots, as in previous years no specimens were picked up by the D-vac sampler. Other than Formicidae, Ichneumonids, Mutillids and Bethlyids were the most common families represented.

An additional interesting phenomena is the absence of the smaller parasitic Hymenoptera. It can be hypothezed that they are escaping through the mesh covering the drop trap before they are vacuumed up. Experience on other grasslands with 100 sweep samples in which a beating net has been used has yielded large numbers of minute parasitic Hymenoptera. The parasitic Hymenoptera present occurred primarily in the water only plots.

Coleoptera: Twenty-three families of beetles are represented in the samples, only eight of which occur consistently throughout the plots over most of the season. Those beetle families encountered on an occassional basis were Histeridae, Phalacridae, Bruchidae, Elateridae, Mordellidae, Orthoperidae, Silphidae, Melyridae, Nitidulidae, Cleridae, Cucujidae, Cantheridae, Leptoderidae and Meloidae. It should be noted that Mordellids, Nitidulids, Bruchids, Cantherids and meloids are commonly found only associated with the flower heads of blooming forbs, so they would be missed unless one of these flowering plants occurred in the sample.

As a group Coleoptera were most abundant in the water treated plots, being almost twice as populus in the water plus nitrogen plots as in the water only plots on most dates. Among the most abundantly collected families on the plots, the Anthicids (flower beetles), Carabids (ground beetles, Chrysomelids (leaf beetles) and Staphylinids were those which

influenced the total Coleoptera count. Most members of the first three families, occurring on grasslands, are plant tissue feeders and could be expected to associated themselves with the more succulent forage.

Among the Carabidae, only *Stenolophus rotundatus* LeConte, and two species of *Calasoma* (predators) occurred consistently throughout the plots and their response to both water treatments was positive. Only two species of Chrysomelids showed a positive response to the treatments, Chry #01 and *Distigmoptera borealis* Blake. Both of these responded strongly to the water treatment, but not to the water plus nitrogen treatment. Three species of Coccinellids (aphid predators), *Hippodamia convergens* Guerin-Meneville, *H. parenthesis* (Say) and *Hyperaspis quadrivittata* LeConte showed a definite preference for both water treatments.

Diptera: In 1973, the two winged flies were more abundant in the ESA plots than in previous years. The water plus nitrogen plots were most favored, with several times the numbers of Diptera occurring there in as in the other plots. The Ceratopogonids (biting midges) and Scatopsids (minute black scavenger flies), whose larvae feed as scavengers on decaying vegetable matter, provided the numbers which influenced the aforementioned figures. Members of other families (Scatopsidae, Sphaeroceridae and Chironomidae) which occurred in much smaller numbers, have larvae which have similar scavenging habits. When present in the samples, Chloropids (frit flies) and Tephritids (fruit flies) were found only in the water and water plus nitrogen treatments during the growing season. Specimens of Asilidae (robber flies), the only predatory flies picked up on these plots, were collected on only 2 sampling dates. This is not surprising since predators tend to be of infrequent occurrence. This family should be sampled using a treatment method.

Comparison of Group Totals in Numbers and Biomass

On all sample dates except one (August 16), the water plus nitrogen plots contained the greatest number of individuals. The presence of large numbers of ants, *Monomorium minimum* Solenopsis probably colonies of them, explains this discrepancy. With the exception of two dates, May 25 and August 16, these plots also contained the greatest biomass (Tables 1-9, 19-28). After the first sampling date the water only plots also contained what appear to be significantly higher populations of arthropods than did plots not receiving water. (Fig. 1 and 2). Similar results are shown by the biomass figures (Tables 19-28).

Data are presented in Tables 37 through 54 relative to the abundance and biomass of arthropods collected from the ESA plots and analyzed according to food habit. These same data are presented graphically in Fig. 3 to 12.

The rationale for presenting the data on a trophic level is twofold. First, by so doing one can gain some insight into the competitive effect of insects versus other herbivores. Secondly, when combined in this manner the numbers are great enough to provide a measure of reliability in the differences between treatments.

Trophic levels for organisms have been determined, where possible, at the species level through observation, diet analysis and personal knowledge of the species as they occur in other habitats. Where no information was available, we have resorted to the literature, first at the species level and then at higher levels of classification if nothing was known about the species. At the later level, the trophic level has been

inferred by the habits of close relatives. This information has been compiled by myself and Dr. Robin Andrews of NREL for most species occurring on the Pawnee Grassland. Where no information has been forthcoming, the insect tropic level has been designated as unknown. Based on the amount of effort that has gone into designating trophic levels for grassland insects, Dr. Andrews and myself believe this listing is the most accurate of any list yet produced where large numbers of insects have been involved (See Appendix I).

Plant Sap Feeding Arthropods

With the exception of the first two sampling dates, May 15 and 25, those plots receiving a water treatment contained almost three times as many plant sap feeding arthropods as did those not receiving water. Those plots receiving nitrogen as well as water contained slightly more plant sap feeders than did those treated only with water. Differences in biomass after the first two sample dates was even more striking indicating the nutritional benefits of plants treated with nitrogen to the "well being" of plant sap feeders. The low numbers of plant sap feeders in those plots not treated with water essentially parallels the data collected in 1971. As in that year the application of nitrogen did not serve to enhance the attractiveness of those plots to insects, presumably because lack of water kept the nitrogen from becoming available to the flora.

Plant Tissue Feeding Arthropods

The plant tissue feeding arthropods show a more striking response to the availability of plants in the plots receiving water in the early part of the season, but their numbers decline drastically after mid June.

Thereafter, their numbers are only slightly more than for those in plots not receiving water. There appears to be little difference in preference by plant tissue feeders for plants treated with water versus plants treated with water plus nitrogen. This data more or less parallels that collected in 1971. The biomass picture is one which seems to indicate that on a weight basis insects "do better" in those plots treated with water, but that it is difficult to show a significant difference between the weights of those occurring in the water treated plots versus those in the water plus nitrogen plots. The application of nitrogen alone does not seem to make those plots more "attractive" to plant tissue feeders than those which received no treatment.

Omnivores (Ants)

The omnivore picture is somewhat confusing since on most dates those plots receiving water alone contained more insects and these insects weighed more because omnivores are ants and ants were more abundant in E than G. On two sampling dates (May 25 and August 16) the differences in both numbers and biomass were quite significant. Otherwise, both in numbers and biomass, omnivores were essentially equal on all plots. This would seem to indicate that insufficient numbers of omnivores are collected by the D-vac treatment to provide reliable estimates of the effects of artifically induced environmental stress.

Predators

Predators, in the water plus nitrogen plots exceeded, both in members and biomass, those in all other plots. One could thus imply that the majority of their prey are plant sap feeding insects and since in weight they were more than three times that of those in the water only plots, they

derived a greater nutritional value from their prey. The water only plots while containing significantly more predators than did the non-water treated plots, were far less frequently collected than in water plus nitrogen plots. In 1971, there was no essential difference in predator numbers between plots although here again in late August predator biomass was considerably greater in the water plus nitrogen treatments.

Scavengers

Neither in numbers or biomass were there any significant differences in scavengers between plots except on May 25th. The high numbers on this date result from a high incidence of members of the dipterous family Ceratopogonidae, undoubtedly an emergence phenomena.

Based on this data it would appear that scavengers are not responding to an increase in available litter or insect refuse. What is probably happening is that the D-vac apparatus is not adequately sampling scavengers either because they spend the daylight hours in holes in the ground or because the majority of scavengers are mites which it is known are not adequately sampled by this method. Because of the mobility of most scavengers, I tend to favor the former explanation. One other alternative presents itself. This is that insect scavengers are an incidental part of the grassland component and, in fact, the majority of litter breakdown is caused by fungi and bacteria on the grassland. It is also possible that some insects assigned to other categories aid in litter and refuse breakdown, such as grasshoppers which while nominally are regarded as plant tissue feeders, are to be regarded as scavengers in part (Lavigne and Pfadt 1964) due to their habit of eating cow dung and occassionally each other. We have no way of measuring incidental scavenging.

Parasites and Parasitoids

These organisms did not occur in the samples with sufficient frequency to allow them to be graphed. The limited data indicated that on the whole twice as many parasites occurred in the plots treated with water. All of the parasites collected were fairly indicating another deficiency in the D-vac sampling technique as applied on the Pawnee Grassland. Sweep net sampling with a beating net have shown that numbers of minute parasitic Hymenoptera do occur on the grasslands. Even though the netting on the D-vac sampler was changed to one of smaller mash size, this still allowed the escape of minute Hymenoptera. Since the samples are then transported in Organdy bags, a second opportunity was presented for the escape of these Hymenoptera. Because of the exceptionally great time lag in getting corrected data out of the computer, (1 1/2 to 2 years), this aspect of D-vac ineffiency was not recognized until too late to modify the equipment.

Plant Pollen Feeders

The collection of plant pollen feeders is dependent upon the D-vac trap falling over flowering forbs, a rare occurrence as indicated by the data. The limited data supports the idea that greater numbers of plant pollen feeders occur in those plots treated with water, presumably due to the presence of greater numbers of flowering forbs. As pointed out by Ellstrom and Watts (1974).

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Table 1. Comparison of mean numbers/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date May 15, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	0.6	2.2	--	6.2
Acarina	--	2.4	--	3.4
Collembola	--	--	--	--
Orthoptera	0.2	--	--	--
Hemiptera	36.8	15.6	9.4	45.0
Homoptera	4.2	17.8	4.4	2.0
Thysanoptera	0.2	--	--	24.8
Lepidoptera	1.2	0.8	0.4	--
Hymenoptera	2.2	5.0	0.2	2.2
Coleoptera	14.0	45.6	20.4	124.0
Diptera	--	0.8	0.2	6.8
Neuroptera	--	--	0.2	--
Siphonaptera	--	--	--	--
Chelonethida	--	--	--	--
TOTAL (Computer)	59.4	90.2	35.2	214.4

Table 2. Comparison of mean numbers/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction appararatus at the time of the first major sampling date May 25, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	0.8	1.0	--	21.0
Acarina	3.4	12.2	--	18.4
Collembola	--	--	--	--
Orthoptera	--	0.4	--	0.2
Hemiptera	420.2	207.0	205.4	151.2
Homoptera	11.0	34.2	8.4	14.4
Thysanoptera	3.6	3.4	--	50.8
Lepidoptera	0.6	332.8	0.2	--
Hymenoptera	18.4	246.4	34.8	38.0
Coleoptera	20.8	101.4	45.8	235.2
Diptera	0.8	0.2	0.8	831.4
Neuroptera	--	--	--	--
Siphonaptera	--	--	--	--
Chelonethida	--	--	--	--
TOTAL (Computer)	479.6	939.0	295.4	1,360.6

Table 3. Comparison of mean numbers/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date June 13, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	0.8	1.0	0.4	10.0
Acarina	--	46.4	--	26.2
Collembola	--	--	--	--
Orthoptera	0.2	--	--	--
Hemiptera	46.4	71.8	63.2	217.4
Homoptera	22.8	171.8	17.8	139.8
Thysanoptera	1.2	16.8	2.0	15.2
Lepidoptera	0.6	308.4	0.4	1.0
Hymenoptera	1.4	94.0	16.8	33.8
Coleoptera	21.6	97.6	29.0	192.0
Diptera	1.0	25.4	0.2	415.4
Neuroptera	--	--	--	--
Siphonaptera	--	--	--	--
Chelonethida	0.2	--	--	--
Psocoptera	--	--	--	2.0
Solpugida	--	--	0.4	--
TOTAL (Computer)	96.2	833.2	130.2	1,052.8

Table 4. Comparison of mean numbers/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date July 5, 1973.

Group	No treatment	Water	Nitrogen	Water plus nigrogen
Araneida	0.2	1.8	1.0	5.0
Acarina	2.0	43.0	0.2	21.6
Collembola	--	--	--	--
Orthoptera	--	--	0.8	0.6
Hemiptera	5.4	49.0	6.4	147.4
Homoptera	41.8	234.0	19.0	243.4
Thysanoptera	--	3.0	0.4	--
Lepidoptera	0.6	15.0	1.8	7.8
Hymenoptera	0.8	38.0	1.6	13.8
Coleoptera	2.2	93.4	9.2	150.0
Diptera	1.0	8.8	0.6	15.6
Neuroptera	0.2	--	--	--
Siphonaptera	--	--	--	--
Chelonethida	--	--	--	--
Psocoptera	0.2	--	--	0.6
TOTAL (Computer)	54.2	486.0	41.0	605.8

Table 5. Comparison of mean numbers/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date July 25, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	0.2	5.6	0.2	51.2
Acarina	--	66.8	--	5.8
Collembola	--	--	--	--
Orthoptera	--	0.4	0.2	1.2
Hemiptera	13.6	25.8	5.4	105.8
Homoptera	22.6	122.2	16.4	75.8
Thysanoptera	2.2	--	--	--
Lepidoptera	0.8	7.6	--	30.2
Hymenoptera	35.8	102.4	65.8	56.6
Coleoptera	11.0	130.2	17.6	127.4
Diptera	8.6	1.6	0.4	15.0
Neuroptera	--	--	0.2	0.2
Siphonaptera	--	--	--	--
Chelonethida	--	--	--	--
TOTAL (Computer)	94.8	462.6	106.2	469.2

Table 6. Comparison of mean numbers/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date August 16, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	0.4	2.2	1.4	54.6
Acarina	0.4	21.2	0.2	--
Collembola	--	--	--	--
Orthoptera	0.8	1.0	0.6	1.2
Hemiptera	5.0	26.4	5.2	53.8
Homoptera	14.2	70.4	15.0	154.6
Thysanoptera	--	0.6	0.2	--
Lepidoptera	0.4	1.4	0.2	0.2
Hymenoptera	28.6	438.0	4.8	22.6
Coleoptera	8.8	107.8	8.0	81.0
Diptera	4.8	0.2	0.4	33.2
Neuroptera	--	--	--	--
Siphonaptera	--	--	--	--
Chelonethida	--	--	--	--
TOTAL (Computer)	63.4	669.2	36.0	401.2

Table 7. Comparison of mean numbers/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date September 6, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	1.2	6.6	1.2	90.0
Acarina	0.4	25.2	--	6.0
Collembola	--	--	--	0.2
Orthoptera	--	1.0	0.4	0.4
Hemiptera	8.2	61.0	9.6	61.8
Homoptera	13.6	75.6	13.4	153.8
Thysanoptera	--	--	1.6	--
Lepidoptera	0.6	0.2	2.6	0.4
Hymenoptera	3.2	20.2	6.4	44.0
Coleoptera	11.8	74.6	3.6	130.2
Diptera	0.2	4.0	--	55.2
Neuroptera	--	--	--	0.2
Siphonaptera	--	--	--	--
Chelonethida	--	--	--	--
TOTAL (Computer)	39.2	268.4	38.8	542.2

Table 8. Comparison of mean numbers/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date October 8, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	--	7.0	--	67.6
Acarina	1.2	20.6	--	1.2
Collembola	--	--	--	--
Orthoptera	--	0.2	--	--
Hemiptera	27.8	56.4	8.8	155.0
Homoptera	13.0	43.0	19.8	87.4
Thysanoptera	1.6	1.0	6.2	--
Lepidoptera	0.4	2.4	4.6	--
Hymenoptera	9.2	15.4	5.2	1.2
Coleoptera	10.6	42.6	18.2	81.6
Diptera	7.0	19.8	4.8	31.4
Neuroptera	0.2	--	--	--
Siphonaptera	--	--	--	--
Chelonethida	--	--	--	--
TOTAL (Computer)	71.0	208.4	67.6	425.4

Table 9. Comparison of mean numbers/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date December 7, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	1.6	5.0	--	46.4
Acarina	0.4	5.8	1.4	0.6
Collembola	--	--	--	--
Orthoptera	--	0.2	--	--
Hemiptera	8.2	16.6	4.8	64.0
Homoptera	16.2	22.2	24.8	34.4
Thysanoptera	--	--	--	--
Lepidoptera	6.4	4.6	13.8	0.2
Hymenoptera	--	--	--	1.2
Coleoptera	6.6	38.2	11.2	53.6
Diptera	9.0	18.2	--	19.0
Neuroptera	--	--	--	--
Siphonaptera	--	--	--	--
Chelonethida	--	--	--	--
TOTAL (Computer)	48.4	110.8	56.0	219.4

Table 10. Comparison of mean numbers/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date May 15, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	--	--	1.0
Tenebrionidae	1.2	2.8	3.6	2.6
Curculionidae	6.6	2.2	6.2	1.2
Coccinellidae	0.4	1.4	0.4	0.2
Staphylinidae	--	--	--	38.6
Carabidae	1.2	1.8	3.8	34.0
Chrysomelidae	2.6	30.2	4.6	0.4
Anthicidae	--	5.2	1.2	42.0
Histeridae	0.2	0.2	0.2	0.4
Phalacridae	1.6	0.2	0.2	0.2
Bruchidae	--	1.2	--	0.2
Elateridae	--	--	--	0.2
Mordellidae	--	--	--	0.6
Orthoperidae	--	--	--	2.2
HEMIPTERA				
Lygaeidae	36.4	15.2	8.4	44.6
Cydnidae	--	--	--	--
Tingidae	0.2	0.2	--	--

Table 10. Continued

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA (cont.)				
Miridae	0.2	--	0.8	--
Nabidae	--	--	--	--
Coreidae	--	--	0.2	--
Corixidae				
Reduviidae	--	0.2	--	--
Anthocoridae	--	--	--	0.2
Pentatomidae	--	--	--	0.2
HOMOPTERA				
Cicadellidae	4.2	17.6	4.4	2.0
Pseudococcidae	--	0.2	--	--
Aphididae	--	--	--	--
Psyllidae	--	--	--	--
DIPTERA				
Cecidomyiidae	--	0.6	--	6.6
Culicidae	--	--	--	--
Calliphoridae	--	--	--	--
Syrphidae	--	--	0.2	--
Sciaridae	--	--	--	0.2

Table 11. Comparison of mean numbers/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date May 25, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	24.0	0.2	1.0
Tenebrionidae	1.8	1.0	11.6	5.4
Curculionidae	6.4	5.0	7.8	0.8
Coccinellidae	--	1.0	0.2	0.2
Staphylinidae	--	29.6	0.8	82.8
Carabidae	7.8	14.8	10.6	95.6
Chrysomelidae	4.0	12.6	6.0	2.0
Anthicidae	--	10.8	--	44.8
Mordellidae	0.2	--	--	0.8
Phalacridae	--	1.8	--	--
Histeridae	--	--	3.0	0.4
Bruchidae	--	--	--	0.2
Elateridae	--	--	--	0.2
HEMIPTERA				
Lygaeidae	419.4	202.0	204.2	150.8
Cydnidae	--	--	0.4	--
Tingidae	0.4	--	0.4	--
Miridae	0.4	4.6	0.2	--

Table 11. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Nabidae	--	0.4	--	0.4
Coreidae	--	--	0.2	--
Corixidae	--	--	--	--
HOMOPTERA				
Cicadellidae	9.4	32.4	8.4	14.4
Pseudococcidae	--	1.6	--	--
Aphididae	1.6	--	--	--
Psyllidae	--	0.2		--
DIPTERA				
Cecidomyiidae	0.6	--	--	10.0
Culicidae	--	--	--	--
Calliphoridae	--	--	--	--
Bibiomidae	--	0.2	--	--
Tephritidae	--	--	0.6	--
Ceratopogonidae	--	--	--	821.4

Table 12. Comparison of mean numbers/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date June 13, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	0.8	8.0	0.2	1.2
Tenebrionidae	1.4	1.2	1.8	3.2
Curculionidae	5.6	1.8	5.6	1.8
Coccinellidae	2.2	1.8	0.2	--
Staphylinidae	--	6.8	--	32.2
Carabidae	5.2	20.2	15.0	122.6
Chrysomelidae	0.4	10.0	5.4	1.4
Anthicidae	--	41.4	--	22.8
Phalacridae	0.6	0.2	--	0.8
Bruchidae	--	0.2	--	--
Mordellidae	--	0.4	--	2.0
Orthroperidae	--	3.8	--	0.8
Elateridae	--	--	0.2	--
Histeridae	--	--	0.6	--
HEMIPTERA				
Lygaeidae	46.2	67.4	62.8	213.4
Cydnidae	--	--	--	--
Tingidae	0.2	0.4	0.4	--

Table 12. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Miridae	--	3.0	--	0.8
Nabidae	--	0.4	--	2.0
Coreidae	--	0.6	--	--
Corixidae	--	--	--	--
Rhopalidae	--	--	--	1.0
Scutelleridae	--	--	--	0.2
HOMOPTERA				
Cicadellidae	20.0	171.2	15.6	137.0
Pseudococcidae	--	--	--	--
Aphididae	--	--	--	--
Psyllidae	--	0.2	--	0.6
Issidae	2.8	0.2	2.2	2.2
Cercopidae	--	0.2	--	--
DIPTERA				
Cecidomyiidae	--	--	--	273.6
Culicidae	--	--	--	--
Calliphoridae	--	--	--	--
Asilidae	0.6	--	--	1.2
Chloropidae	0.4	0.6	0.2	0.8

Table 12. (Continued)

Family	No Treatment	Water	Nitrogen	Water plus nitrogen
DIPTERA				
Ceratopogonidae	--	24.0	--	60.8
Tephritidae	--	0.6	--	--
Therevidae	--	0.2	--	0.2
Scatopsidae	--	--	--	0.4
Sphaeroceridae	--	--	--	0.4
Chironomidae	--	--	--	0.4

Table 13. Comparison of mean numbers/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date July 5, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	5.6	0.2	1.0
Tenebrionidae	--	2.8	0.4	1.8
Curculionidae	0.6	3.4	1.8	1.6
Coccinellidae	0.4	2.4	--	1.2
Staphylinidae	--	17.8	1.4	19.4
Carabidae	--	14.0	3.0	82.0
Chrysomelidae	1.0	6.8	0.8	8.0
Anthicidae	0.2	37.6	1.6	29.4
Bruchidae	--	0.4	--	--
Phalacridae	--	1.6	--	1.4
Silphidae	--	0.2	--	--
Histeridae	--	--	--	0.4
Melyridae	--	--	--	1.2
Mordellidae	--	--	--	0.2
Nitidulidae	--	--	--	1.2
HEMIPTERA				
Lygaeidae	4.6	44.0	5.8	137.2
Cydnidae	--	--	0.2	--
Tingidae	--	--	--	--
Miridae	0.4	2.4	0.2	3.4

Table 13. (Continued)

Family	treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Nabidae	0.4	1.8	--	6.0
Coreidae	--	--	--	--
Corixidae	--	--	--	--
Coriscidae	--	0.2	--	--
Anthocoridae	--	0.4	--	--
Rhopalidae	--	0.2	0.2	0.8
HOMOPTERA				
Cicadellidae	41.4	229.0	18.4	238.8
Pseudococcidae	--	--	--	--
Aphididae	--	2.0	--	2.4
Psyllidae	0.4	0.8	0.6	1.4
Issidae	--	1.8	--	0.8
Dictyopharidae	--	0.4	--	--
DIPTERA				
Cecidomyiidae	--	1.8	--	9.4
Culicidae	--	--	--	--
Calliphoridae	--	--	--	--
Sphaeroceridae	1.0	--	0.6	0.6
Bombyliidae	--	0.2	--	--
Chloropidae	--	3.2	--	3.4
Sarcophagidae	--	0.2	--	--

Table 13. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
Sepsidae	--	0.6	--	--
Syrphidae	--	0.2	--	0.2
Tachinidae	--	0.4	--	--
Tephritidae	--	2.2	--	1.2
Scatopsidae	--	--	--	0.8

Table 14. Comparison of mean numbers/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treamtents with a D-vac suction apparatus at the time of the first major sampling date July 25, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	4.2	--	2.8
Tenebrionidae	0.6	1.8	1.6	2.6
Curculionidae	2.2	4.2	5.4	1.2
Coccinellidae	0.4	2.4	--	--
Staphylinidae	--	3.2	--	29.0
Carabidae	1.2	12.8	2.0	63.2
Chrysomelidae	3.4	70.4	7.6	3.4
Anthicidae	2.6	22.2	1.0	22.0
Elateridae	0.4	--	--	--
Histeridae	0.2	--	--	--
Cleridae	--	0.2	--	--
Bruchidae	--	--	--	0.4
Melyridae	--	--	--	0.4
Mordellidae	--	--	--	0.2
Phalacridae	--	--	--	0.2
Silphidae	--	--	--	1.2
HEMIPTERA				
Lygaeidae	12.2	22.2	5.2	101.2
Cydnidae	--	0.2	0.2	--

Table 14. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Tingidae	1.2	--	--	--
Miridae	--	1.6	--	0.2
Nabidae	0.2	1.6	--	4.0
Coreidae	--	--	--	0.2
Corixidae	--	--	--	--
Anthocoridae	--	0.2	--	--
Rhopalidae	--	--	--	0.2
HOMOPTERA				
Cicadellidae	22.4	120.8	16.4	72.2
Pseudococcidae	--	--	--	--
Aphididae	--	--	--	--
Psyllidae	--	0.6	--	1.4
Issidae	--	0.2	--	2.2
Cercopidae	--	0.2	--	--
Dictyopharidae	0.2	0.4	--	--
DIPTERA				
Cecidomyiidae	8.2	--	--	--
Culicidae	--	--	--	--
Calliphoridae	--	--	--	--
Asilidae	0.4	--	--	--
Chloropidae	--	0.8	0.2	0.4

Table 14. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
DIPTERA				
Scatopridae	--	0.6	0.2	0.2
Sciomyzidae	--	0.2	--	--
Ceratopogomidae	--	--	--	13.6
Chironomidae	--	--	--	0.2
Tephritidae	--	--	--	0.4
Tipulidae	--	--	--	0.2

Table 15. Comparison of mean numbers/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date August 16, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	0.2	0.2	4.4
Tenebrionidae	0.6	1.6	0.2	2.0
Curculionidae	1.8	2.6	1.4	--
Coccinellidae	0.2	0.4	--	0.8
Staphylinidae	--	20.0	--	33.2
Carabidae	0.8	6.4	1.2	20.6
Chrysomelidae	3.2	51.4	4.2	7.4
Anthicidae	1.8	23.6	0.6	10.2
Cucujidae	0.2	--	--	--
Bruchidae	--	0.2	--	--
Silphidae	--	0.2	--	0.8
Cleridae	--	--	0.2	1.0
Phalacridae	--	--	--	0.6
HEMIPTERA				
Lygaeidae	3.6	24.6	3.2	45.4
Cydnidae	--	--	0.4	--
Tingidae	0.2	--	1.2	0.4
Miridae	1.0	--	0.2	2.8
Nabidae	0.2	0.8	--	3.8

Table 15. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Coreidae	--	0.2	--	--
Corixidae	--	--	--	--
Reduviidae	--	0.4	--	1.0
Rhopalidae	--	0.4	0.2	--
Pentatomidae	--	--	--	0.4
HOMOPTERA				
Cicadellidae	13.8	70.0	14.8	154.6
Pseudococcidae	--	--	--	--
Aphididae	--	--	--	--
Psyllidae	--	--	--	--
Issidae	0.2	--	--	--
Cercopidae	--	0.2	--	--
Dictyopharidae	0.2	--	--	--
DIPTERA				
Cecidomyiidae	4.6	--	--	--
Culicidae	--	--	--	--
Calliphoridae	--	--	--	1.0
Scatopsidae	0.2	--	0.2	24.2
Chloropidae	--	0.2	0.2	--
Ceratopogonidae	--	--	--	7.8
Sepsidae	--	--	--	0.2

Table 16. Comparison of mean numbers/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date September 6, 1973.

Family	No treamtent	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	0.6	--	0.8
Tenebrionidae	1.2	2.6	0.2	1.4
Curculionidae	2.8	4.6	0.4	0.8
Coccinellidae	1.0	--	--	--
Staphylinidae	--	15.6	--	73.8
Carabidae	2.8	10.2	1.4	31.4
Chrysomelidae	4.0	18.2	1.0	4.2
Anthicidae	--	21.4	0.2	12.2
Bruchidae	--	0.2	--	0.2
Nitidulidae	--	0.2	--	--
Orthoperidae	--	0.2	--	3.4
Cantheridae	--	--	0.2	--
Leptoderidae	--	--	--	0.8
Mordellidae	--	--	--	0.2
Silphidae	--	--	--	0.4
HEMIPTERA				
Lygaeidae	7.4	56.2	7.0	37.4
Cydnidae	0.2	1.2	0.4	--

Table 16. (Continued)

Family	No treatment	Water	Nitrogen	Water Plus nitrogen
HEMIPTERA				
Tingidae	--	--	1.8	--
Miridae	--	0.4	0.2	2.4
Nabidae	--	2.6	0.2	20.4
Coreidae	0.6	--	--	--
Corixidae	--	--	--	--
Rhopalidae	--	0.4	--	--
Scutelleridae	--	0.2	--	0.2
Reduviidae	--	--	--	1.4
HOMOPTERA				
Cicadellidae	13.6	75.6	13.2	150.4
Pseudococcidae	--	--	--	--
Aphididae	--	--	--	3.2
Psyllidae	--	--	--	--
Issidae	--	--	0.2	0.2
DIPTERA				
Cecidomyiidae	--	2.6	--	0.2
Culicidae				
Calliphoridae				
Chloropidae	0.2	0.2	--	--
Sepsidae	--	0.4	--	0.4
Tephritidae	--	0.2	--	0.2

Table 16. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
DIPTERA				
Ceratopogonidae	--	--	--	35.2
Chironomidae	--	--	--	0.2
Scatopsidae	--	--	--	19.0

Table 17. Comparison of mean numbers/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date October 8, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	--	--	--
Tenebrionidae	0.2	0.8	--	0.4
Curculionidae	4.8	3.8	2.6	1.4
Coccinellidae	0.2	0.4	--	0.2
Staphylinidae	0.4	10.0	0.2	47.6
Carabidae	0.4	6.6	0.8	21.4
Chrysomelidae	3.0	9.8	7.0	1.2
Anthicidae	1.2	9.8	7.6	8.8
Phalacridae	0.4	--	--	--
Bruchidae	--	0.2	--	--
Leptoderidae	--	0.4	--	0.4
Orthopteridae	--	0.4	--	0.2
HEMIPTERA				
Lygaeidae	26.6	52.0	7.4	139.0
Cydnidae	0.2	--	--	--
Tingidae	0.2	--	0.4	--
Miridae	0.2	2.4	0.6	7.2
Nabidae	--	0.8	0.2	7.0
Coreidae	--	0.2	--	--

Table 17. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Corixidae				
Anthocoridae	0.2	0.4	0.2	1.4
Pentatomidae	0.2	--	--	0.2
Phymatidae	0.2	--	--	--
Reduviidae	--	0.2	--	--
Rhopalidae	--	0.4	--	--
HOMOPTERA				
Cicadellidae	10.8	41.2	19.2	87.2
Pseudococcidae	--	--	--	--
Aphididae	2.2	--	--	--
Psyllidae	--	--	0.2	--
Issidae	--	1.8	0.4	0.2
DIPTERA				
Cecidomyiidae	7.0	15.4	4.8	30.0
Culicidae	--	--	--	0.6
Calliphoridae	--	--	--	--
Sphaeroceridae	--	3.6	--	--
Lepsidae	--	--	--	0.6

Table 18. Comparison of mean numbers/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date December 7, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	--	--	--
Tenebrionidae	0.4	1.0	1.0	2.0
Curculionidae	1.6	3.4	1.6	0.2
Coccinellidae	--	0.2	--	--
Staphylinidae	--	0.4	--	11.2
Carabidae	--	0.2	--	23.4
Chrysomelidae	3.2	29.2	5.6	4.2
Anthicidae	0.8	3.2	2.8	9.4
MEloidae	0.4	--	--	3.2
Phalacridae	0.2	0.4	0.2	--
Elateridae	--	0.2	--	--
HEMIPTERA				
Lygaeidae	7.8	16.4	3.6	51.8
Cydnidae	--	--	--	--
Tingidae	0.4	--	1.2	--
Miridae	--	--	--	2.4
Nabidae	--	--	--	7.8
Coreidae	--	--	--	--
Corixidae	--	--	--	--

Table 18. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Anthocoridae	--	0.2	--	1.2
Pentatomidae	--	--	--	0.6
Reduviidae	--	--	--	0.2
HOMOPTERA				
Cicadellidae	16.2	20.0	24.8	34.4
Pseudococcidae	--	--	--	--
Aphididae	--	2.2	--	--
Psyllidae	--	--	--	--
DIPTERA				
Cecidomyiidae	9.0	18.2	--	19.0
Culicidae	--	--	--	--
Calliphoridae	--	--	--	--

Table 19. Comparison of mean biomass in g/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date May 15, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	.00184	.01708	--	.01351
Acarina	--	.00060	--	.00003
Collembola	--	--	--	--
Orthoptera	.05154	--	--	--
Hemiptera	.01043	.00469	.00412	.01621
Homoptera	.00220	.01029	.00274	.00288
Thysanoptera	.00001	--	--	.00099
Lepidoptera	.00447	.01854	.01804	--
Hymenoptera	.00105	.00219	.00008	.00141
Coleoptera	.03825	.07378	.05554	.10698
Diptera	--	.00012	.00046	.00119
Neuroptera	--	--	.00024	--
Siphonoptera	--	--	--	--
Chelonethnida	--	--	--	--
TOTAL (Computer)	.10978	.12729	.08122	.14321

Table 20. Comparison of mean biomass in g/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date May 25, 1973

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	.00100	.00421	--	.02562
Acarina	.00003	.00030	--	.00014
Collembola	--	--	--	--
Orthoptera	--	.00317	--	.01174
Hemiptera	.10660	.04246	.05596	.04283
Homoptera	.00422	.02298	.00442	.00877
Thysanoptera	.00014	.00014	--	.00203
Lepidoptera	.01415	.11648	.00902	--
Hymenoptera	.01289	.32065	.04993	.03955
Coleoptera	.04690	.06587	.12386	.17175
Diptera	.00023	.00031	.00030	.04287
Neuroptera	--	--	--	--
Siphonoptera	--	--	--	--
Chelonethnida	--	--	--	--
TOTAL (Computer)	.18617	.57660	.24349	.34531

Table 21. Comparison of mean biomass in g/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date June 13, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	.00932	.00226	.00032	.02019
Acarina	--	.00066	--	.00052
Collembola	--	--	--	--
Orthoptera	.01174	--	--	--
Hemiptera	.01419	.02230	.01978	.07273
Homoptera	.00575	.08350	.00523	.07093
Thysanoptera	.00005	.00075	.00008	.00063
Lepidoptera	.00929	.12584	.00927	.03201
Hymenoptera	.00101	.10866	.01348	.03795
Coleoptera	.08769	.08558	.10043	.27934
Diptera	.00348	.00217	.00018	.04473
Neuroptera	--	--	--	--
Siphonoptera	--	--	--	--
Chelonethnida	.00042	--	--	--
Psocoptera	--	--	--	.00002
Solpugida	--	--	.00787	--
TOTAL (Computer)	.14294	.43172	.15665	.55904

Table 22. Comparison of mean biomass in g/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date July 5, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	.00002	.01505	.00030	.03875
Acarina	.00016	.00046	.00002	.00042
Collembola	--	--	--	--
Orthoptera	--	--	.02899	.01582
Hemiptera	.00315	.01973	.00384	.05698
Homoptera	.01829	.09857	.00493	.11350
Thysanoptera	--	.00012	.00002	--
Lepidoptera	.01408	.01332	.00840	.03503
Hymenoptera	.00488	.05737	.00862	.02637
Coleoptera	.00648	.09115	.01453	.34734
Diptera	.00004	.01590	.00002	.00634
Neuroptera	.00027	--	--	--
Siphonoptera	--	--	--	--
Chelonethnida	--	--	--	--
Psocoptera	--	--	--	.00001
TOTAL (Computer)	.04738	.31166	.06967	.64057

Table 23. Comparison of mean biomass in g/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date July 25, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	.00008	.00731	.00180	.05014
Acarina	--	.00067	--	.00006
Collembola	--	--	--	--
Orthoptera	--	.00496	.00262	.04172
Hemiptera	.00445	.01406	.00334	.08122
Homoptera	.01037	.08319	.01234	.10967
Thysanoptera	.00009	--	--	--
Lepidoptera	.00029	.02782	--	.14282
Hymenoptera	.02458	.13933	.05999	.08276
Coleoptera	.02757	.13508	.04516	.25150
Diptera	.00519	.00131	.00022	.00172
Neuroptera	--	--	.00016	.00002
Siphonoptera	--	--	--	--
Chelonethnida	--	--	--	--
TOTAL (Computer)	.07263	.41372	.12564	.76164

Table 24. Comparison of mean biomass in g/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date August 16, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	.00038	.00987	.00127	.03982
Acarina	.00010	.00027	.00005	--
Collembola	--	--	--	--
Orthoptera	.02372	.03570	.01699	.06222
Hemiptera	.00393	.02275	.00631	.09886
Homoptera	.01082	.03224	.01471	.12407
Thysanoptera	--	.00003	.00001	--
Lepidoptera	.00021	.00307	.00000	.00208
Hymenoptera	.03307	.53257	.00335	.03259
Coleoptera	.01771	.08412	.01408	.09292
Diptera	.00086	.00018	.00022	.01238
Neuroptera	--	--	--	--
Siphonoptera	--	--	--	--
Chelonethnida	--	--	--	--
TOTAL (Computer)	.09080	.72081	.05700	.46495

Table 25. Comparison of mean biomass in g/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date September 6, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	.00401	.00796	.00502	.08605
Acarina	.00010	.00030	--	.00025
Collembola	--	--	--	.00000
Orthoptera	--	.03346	.04724	.01228
Hemiptera	.00752	.02664	.00730	.11167
Homoptera	.01453	.06978	.00341	.08872
Thysanoptera	--	--	.00008	--
Lepidoptera	.00020	.00686	.07593	.00893
Hymenoptera	.00516	.02256	.00444	.05928
Coleoptera	.05493	.07371	.01792	.17851
Diptera	.00018	.00191	--	.00524
Neuroptera	--	--	--	.00002
Siphonoptera	--	--	--	--
Chelonethnida	--	--	--	--
TOTAL (Computer)	.08663	.24316	.16133	.55095

Table 26. Comparison of mean biomass in g/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date October 8, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	--	.03269	--	.07551
Acarina	.00012	.00071	--	.00030
Collembola	--	--	--	--
Orthoptera	--	.00903	--	--
Hemiptera	.01869	.02302	.00434	.21115
Homoptera	.00491	.02079	.00677	.04805
Thysanoptera	.00008	.00002	.00029	--
Lepidoptera	.00128	.00084	.00161	--
Hymenoptera	.00535	.01300	.00263	.00006
Coleoptera	.02952	.04433	.01540	.10353
Diptera	.00078	.00487	.00086	.00654
Neuroptera	.00002	--	--	--
Siphonoptera	--	--	--	--
Chelonethnida	--	--	--	--
TOTAL (Computer)	.06074	.14928	.03190	.44514

Table 27. Comparison of mean biomass in g/m^2 of aboveground arthropods of different groups taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date December 7, 1973.

Group	No treatment	Water	Nitrogen	Water plus nitrogen
Araneida	.00071	.00990	--	.09479
Acarina	.00010	.00067	.00015	.00015
Collembola	--	--	--	--
Orthoptera	--	.00446	--	--
Hemiptera	.00331	.00346	.00277	.10189
Homoptera	.00615	.01235	.00965	.02060
Thysanoptera	--	--	--	--
Lepidoptera	.01649	.02901	.01051	.00464
Hymenoptera	--	--	--	.00115
Coleoptera	.01060	.04561	.01649	.05789
Diptera	.00162	.00328	--	.00342
Neuroptera	--	--	--	--
Siphonoptera	--	--	--	--
Chelonethnida	--	--	--	--
TOTAL (Computer)	.03898	.10873	.03956	.28453

Table 28. Comparison of mean biomass in g/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date May 15, 1973

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	--	--	.00105
Tenebrionidae	.00462	.01245	.01386	.01001
Curculionidae	.02299	.00354	.01642	.00240
Coccinellidae	.00108	.00377	.00074	.00064
Staphylinidae	--	--	--	.03069
Carabidae	.00561	.01504	.01829	.05110
Chrysomelidae	.00283	.03582	.00513	.00006
Anthicidae	--	.00095	.00014	.00536
Histeridae	.00072	.00072	.00072	.00466
Phalacridae	.00035	.00004	.00004	.00004
Bruchidae	--	.00104	--	.00018
Elateridae	--	--	--	.00033
Mordellidae	--	--	--	.00022
Orthoperidae	--	--	--	.00002
HEMIPTERA				
Lygaeidae	.01020	.00240	.00209	.00970
Cydnidae	--	--	--	--
Tingidae	.00014	.00003	--	--
Miridae	.00009	--	.00102	--
Nabidae	--	--	--	--

Table 28. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Coreidae	--	--	.00100	--
Corixidae	--	--	--	--
Reduviidae	--	.00226	--	--
Anthocoridae	--	--	--	.00003
Pentatomidae	--	--	--	.00648
HOMOPTERA				
Cicadellidae	.00220	.01019	.00274	.00288
Pseudococcidae	--	.00010	--	--
Aphididae	--	--	--	--
Psyllidae	--	--	--	--
DIPTERA				
Cecidomyiidae	--	.00001	--	.00115
Culicidae	--	--	--	--
Calliphoridae	--	--	--	--
Syrphidae	--	--	.00046	--
Sciaridae	--	--	--	.00003

Table 29. Comparison of mean biomass in g/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date May 25, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	.01728	.00014	.00072
Tenebrionidae	.00563	.00385	.04929	.03219
Curculionidae	.01017	.00234	.00578	.00029
Coccinellidae	--	.00181	.00043	.00043
Staphylinidae	--	.00423	.00037	.04079
Carabidae	.02634	.01840	.04333	.08359
Chrysomelidae	.00426	.01537	.00572	.00144
Anthicidae	--	.00140	--	.00581
Mordellidae	.00007	--	--	.00029
Phalacridae	--	.00040	--	--
Histeridae	--	--	.01719	.00466
Bruchidae	--	--	--	.00018
Elateridae	--	--	--	.00048
HEMIPTERA				
Lygaeidae	.10636	.03739	.05222	.04186
Cydnidae	--	--	.00187	--
Tingidae	.00006	--	.00019	--
Miridae	.00018	.00410	.00026	--
Nabidae	--	.00097	--	.00097
Coreidae	--	--	.00142	--

Table 29. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Corixidae	--	--	--	--
HOMOPTERA				
Cicadellidae	.00405	.02218	.00442	.00877
Pseudococcidae	--	.00078	--	--
Aphididae	.00018	--	--	--
Psyllidae	--	.00002	--	--
DIPTERA				
Cecidomyiidae	.00011	--	--	.00180
Culicidae	--	--	--	--
Calliphoridae	--	--	--	--
Bibionidae	--	.00031	--	--
Tephritidae	--	--	.00020	--
Ceratopogonidae	--	--	--	.04107

Table 30. Comparison of mean biomass in g/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date June 13, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	.00058	.00576	.00014	.00086
Tenebrionidae	.00496	.00462	.00837	.01232
Curculionidae	.01937	.00284	.00462	.00138
Coccinellidae	.00106	.00336	.00010	--
Staphylinidae	--	.00360	--	--
Carabidae	.04902	.04673	.07800	.23017
Chrysomelidae	.00048	.01186	.00658	.00168
Anthicidae	--	.00518	--	--
Phalacridae	.00013	.00004	--	.00018
Bruchidae	--	.00012	--	--
Mordellidae	--	.00014	--	.00072
Orthoperidae	--	.00004	--	.00001
Elateridae	--	--	.00048	--
Histeridae	--	--	.00215	--
HEMIPTERA				
Lygaeidae	.01403	.01396	.01946	.06223
Cydnidae	--	--	--	--
Tingidae	.00016	.00032	.00032	--
Miridae	--	.00387	--	.00066

Table 30. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Nabidae	--	.00113	--	.00558
Coreidae	--	.00301	--	--
Corixidae	--	--	--	--
Rhopalidae	--	--	--	.00248
Scutelleridae	--	--	--	.00178
HOMOPTERA				
Cicadellidae	.00458	.08335	.00429	.06996
Pseudococcidae	--	--	--	--
Aphididae	--	--	--	--
Psyllidae	--	.00002	--	--
Issidae	.00118	.00008	.00094	.00092
Cercopidae	--	.00005	--	--
DIPTERA				
Cecidomyiidae	--	--	--	.03314
Culicidae	--	--	--	--
Calliphoridae	--	--	--	--
Asilidae	.00311	--	--	.00622
Chloropidae	.00037	.00055	.00018	.00074
Ceratopogonidae	--	.00120	--	.00304
Tephritidae	--	.00020	--	--
Therevidae	--	.00022	--	.00042

Table 30. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
DIPTERA				
Scatopsidae	--	--	--	.00006
Sphaeroceridae	--	--	--	.00002
Chironomidae	--	--	--	.00032

Table 31. Comparison of mean biomass in g/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date July 5, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	.00403	.00014	.00082
Tenebrionidae	--	.01439	.00154	.00693
Curculionidae	.00555	.00489	.00368	.00396
Coccinellidae	.00019	.00712	--	.00275
Staphylinidae	--	.00595	.00046	.01512
Carabidae	--	.02868	.00772	.29108
Chrysomelidae	.00060	.01199	.00057	.00806
Anthicidae	.00013	.01253	.00041	.00904
Bruchidae	--	.00025	--	--
Phalacridae	--	.00035	--	.00031
Silphidae	--	.00030	--	--
Histeridae	--	--	--	.00466
Melyridae	--	--	--	.00194
Mordellidae	--	--	--	.00007
Nitidulidae	--	--	--	.00071
HEMIPTERA				
Lygaeidae	.00184	.01153	.00217	.03847
Cydnidae	--	--	.00084	--
Tingidae	--	--	--	--

Table 31. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Miridae	.00026	.00220	.00034	.00316
Nabidae	.00105	.00493	--	.01336
Coreidae	--	--	--	--
Corixidae	--	--	--	--
Coriscidae	--	.00051	--	--
Anthocoridae	--	.00006	--	--
Rhopalidae	--	.00050	.00050	.00198
HOMOPTERA				
Cicadellidae	.01812	.09750	.00468	.11250
Pseudococcidae	--	--	--	--
Aphididae	--	.00016	--	--
Psyllidae	--	--	--	--
Issidae	.00017	.00034	.00025	.00060
Cercopidae	--	.00047	--	.00021
Dictyopharidae	--	.00011	--	--
DIPTERA				
Cecidomyiidae	--	.00032	--	.00169
Culicidae	--	--	--	--
Calliphoridae	--	--	--	--
Sphaeroceridae	.00004	--	.00002	.00002
Bombyliidae	--	.00029	--	--

Table 31. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
DIPTERA				
Chloropidae	--	.00294	--	.00313
Sarcophagidae	--	.00049	--	--
Sepsidae	--	.00011	--	--
Syrphidae	--	.00351	--	.00046
Tachinidae	--	.00749	--	--
Tephritidae	--	.00075	--	.00092
Scatopsidae	--	--	--	.00013

Table 32. Comparison of mean biomass in g/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date July 25, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	.00349	--	.00335
Tenebrionidae	.00851	.00487	.00616	.02375
Curculionidae	.00377	.00981	.01220	.00176
Coccinellidae	.00014	.00598	--	--
Staphylinidae	--	.00046	--	.01884
Carabidae	.00877	.02760	.01795	.18286
Chrysomelidae	.00310	.06515	.00863	.00616
Anthicidae	.00161	.01174	.00023	.00912
Elateridae	.00095	--	--	--
Histeridae	.00072	--	--	--
Cleridae	--	.00069	--	--
Bruchidae	--	--	--	.00025
Melyridae	--	--	--	.00285
Mordellidae	--	--	--	.00007
Phalacridae	--	--	--	.00004
Silphidae	--	--	--	.00178
HEMIPTERA				
Lygaeidae	.00293	.00801	.00250	.06904
Cydnidae	--	.00084	.00084	--

Table 32. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Tingidae	.00096	--	--	--
Miridae	--	.00160	--	.00047
Nabidae	--	--	--	--
Coreidae	--	--	--	.00142
Corixidae	--	--	--	--
Anthocoridae	--	.00003	--	--
Rhopalidae	--	--	--	.00050
HOMOPTERA				
Cicadellidae	.01032	.08289	.01234	.10864
Pseudococcidae	--	--	--	--
Aphididae	--	--	--	--
Psyllidae	--	.00005	--	.00011
Issidae	--	.00008	--	.00092
Cercopidae	--	.00005	--	--
Dictyopharidae	.00006	.00011	--	--
DIPTERA				
Cecidomyiidae	.00148	--	--	--
Culicidae	--	--	--	--
Calliphoridae	--	--	--	--
Asilidae	.00371	--	--	--
Chloropidae	--	.00074	.00019	.00037

Table 32. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
DIPTERA				
Scatopsidae	--	.00010	.00003	.00003
Sciomyzidae	--	.00048	--	--
Ceratopogomidae	--	--	--	.00068
Chironomidae	--	--	--	.00013
Tephritidae	--	--	--	.00047
Tipulidae	--	--	--	.00004

Table 33. Comparison of mean biomass in g/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date August 16, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	.00014	.00014	.00317
Tenebrionidae	.00170	.00566	.00077	.00770
Curculionidae	.00591	.00546	.00139	--
Coccinellidae	.00010	.00236	--	.00364
Staphylinidae	--	.00590	--	.02716
Carabidae	.00497	.00977	.00603	.03525
Chrysomelidae	.00378	.03992	.00488	.00524
Anthicidae	.00119	.01342	.00018	.00598
Cucujidae	.00002	--	--	--
Bruchidae	--	.00030	--	--
Silphidae	--	.00030	--	.00118
Cleridae	--	--	.00069	.00346
Phalacridae	--	--	--	.00013
HEMIPTERA				
Lygaeidae	.00160	.01372	.00270	.05888
Cydnidae	--	--	.00168	--
Tingidae	.00016	--	.00096	.00037
Miridae	.00168	--	.00047	.00622
Nabidae	.00048	.00210	--	.00758

Table 33. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Coreidae	--	.00142	--	--
Corixidae	--	--	--	--
Reduviidae	--	.00452	--	.01130
Rhopalidae	--	.00099	.00050	--
Pentatomidae	--	--	--	.01451
HOMOPTERA				
Cicadellidae	.01037	.03211	.01463	.12407
Pseudococcidae	--	--	--	--
Aphididae	--	--	--	--
Psyllidae	--	--	--	--
Issidae	.00008	.00008	.00008	--
Cercopidae	--	.00005	--	--
Dictyopharidae	.00037	--	--	--
DIPTERA				
Cecidomyiidae	.00083	--	--	--
Culicidae	--	--	--	--
Calliphoridae	--	--	--	.00808
Scatopsidae	.00003	--	.00003	.00387
Chloropidae	--	.00018	.00019	--
Ceratopogonidae	--	--	--	.00039
Sepsidae	--	--	--	.00004

Table 34. Comparison of mean biomass in g/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date September 6, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	.00043	--	.00058
Tenebrionidae	.03562	.01621	.00077	.01946
Curculionidae	.00913	.01300	.00143	.00171
Coccinellidae	.00043	--	--	--
Staphylinidae	--	.00573	--	.04892
Carabidae	.00575	.01017	.01247	.09799
Chrysomelidae	.00400	.01793	.00100	.00421
Anthicidae	--	.00959	.00002	.00395
Bruchidae	--	.00030	--	.00030
Nitidulidae	--	.00012	--	--
Orthoperidae	--	--	--	.00003
Cantheridae	--	--	.00218	--
Leptoderidae	--	--	--	.00058
Mordellidae	--	--	--	.00007
Silphidae	--	--	--	.00059
HEMIPTERA				
Lygaeidae	.00232	.01210	.00338	.06213
Cydnidae	.00094	.00562	.00187	--
Tingidae	--	--	.00144	--

Table 34. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Miridae	--	.00060	.00013	.00316
Nabidae	--	.00555	.00048	.04193
Coreidae	.00426	--	--	--
Corixidae	--	--	--	--
Rhopalidae	--	.00099	--	--
Scutelleridae	--	.00178	--	--
Reduviidae	--	--	--	.00267
HOMOPTERA				
Cicadellidae	.01453	.06978	.00333	.08846
Pseudococcidae	--	--	--	--
Aphididae	--	--	--	.00017
Psyllidae	--	--	--	--
Issidae	--	--	.00008	.00008
DIPTERA				
Cecidomyiidae	--	.00047	--	.00004
Culicidae	--	--	--	--
Calliphoridae	--	--	--	--
Chloropidae	.00018	.00018	--	--
Sepsidae	--	.00008	--	.00008
Tephritidae	--	.00034	--	.00016

Table 34. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
DIPTERA				
Ceratopogonidae	--	--	--	.00176
Chironomidae	--	--	--	.00016
Scatopsidae	--	--	--	.00304

Table 35. Comparison of mean biomass in g/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date October 8, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	.00191	--	--
Tenebrionidae	.00077	.00308	--	.01106
Curculionidae	.01988	.00312	.00664	.00750
Coccinellidae	.00064	.00129	--	.00118
Staphylinidae	.00037	.00502	.00018	.03348
Carabidae	.00412	.01637	.00431	.04780
Chrysomelidae	.00318	.01068	.00271	.00030
Anthicidae	.00047	.00226	.00156	.00192
Phalacridae	.00009	--	--	--
Bruchidae	--	.00030	--	--
Leptoderidae	--	.00029	--	.00029
Orthoperidae	--	--	--	--
HEMIPTERA				
Lygaeidae	.01217	.01316	.00235	.17033
Cydnidae	.00078	--	--	--
Tingidae	.00016	--	.00032	--
Miridae	.00047	.00344	.00115	.01465
Nabidae	--	.00169	.00048	.01644
Coreidae	--	.00142	--	--

Table 35. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Corixidae	--	--	--	--
Anthocoridae	.00003	.00006	.00003	.00021
Pentatomidae	.00491	--	--	.00726
Phymatidae	.00017	--	--	--
Reduviidae	--	.00226	--	.00226
Rhopalidae	--	.00099	--	--
HOMOPTERA				
Cicadellidae	.00473	.02003	.00659	.04797
Pseudococcidae	--	--	--	--
Aphididae	.00018	--	--	--
Psyllidae	--	--	.00002	--
Issidae	--	.00076	.00017	.00008
DIPTERA				
Cecidomyiidae	.00078	.00255	.00086	.00504
Culicidae	--	--	--	.00055
Calliphoridae	--	--	--	--
Spharoceridae	--	.00014	--	--
Sepsidae	--	--	--	.00012

Table 36. Comparison of mean biomass in g/m^2 of aboveground arthropods by family in the major orders taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date December 7, 1973.

Family	No treatment	Water	Nitrogen	Water plus nitrogen
COLEOPTERA				
Scarabaeidae	--	--	--	--
Tenebrionidae	.00154	.00385	.00385	.00770
Curculionidae	.00289	.00430	.00696	.00083
Coccinellidae	--	.00118	--	--
Staphylinidae	--	.00037	--	.01062
Carabidae	--	.00012	--	.01615
Chrysomelidae	.00374	.03465	.00519	.00464
Anthicidae	.00042	.00071	.00044	.00221
Meloidae	.00197	--	--	.01574
Phalacridae	.00004	.00009	.00004	--
Elateridae	--	.00035	--	--
HEMIPTERA				
Lygaeidae	.00299	.00343	.00181	.05091
Cydnidae				
Tingidae	.00032	--	.00096	--
Miridae	--	--	--	.00562
Nabidae	--	--	--	.01888
Coreidae	--	--	--	--
Corixidae	--	--	--	--

Table 36. (Continued)

Family	No treatment	Water	Nitrogen	Water plus nitrogen
HEMIPTERA				
Anthocoridae	--	.00003	--	.00018
Pentatomidae	--	--	--	.02405
Reduviidae	--	--	--	.00226
HOMOPTERA				
Cicadellidae	.00615	.01218	.00965	.02060
Pseudococcidae	--	--	--	--
Aphididae	--	.00018	--	--
Psyllidae	--	--	--	--
DIPTERA				
Cecidomyiidae	.00162	.00328	--	.00342
Culicidae	--	--	--	--
Calliphoridae	--	--	--	--

Table 37. Comparison of mean numbers/m^2 of aboveground arthropods representing different tropic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date May 15, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	41.0	33.0	13.8	72.4
Plant tissue	14.8	44.6	18.6	59.0
Omnivore	2.0	4.4	0.2	2.0
Scavenger	--	--	--	4.6
Predator	1.2	6.4	2.4	75.8
Unknown	0.4	1.8	0.2	0.4
Parasite	--	--	--	0.2

Table 38. Comparison of mean biomass in g/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date May 15, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	.01255	.01201	.00686	.02010
Plant tissue	.09250	.08814	.07108	.05230
Omnivore	.00089	.00216	.00008	.00140
Scavenger	--	--	--	.00112
Predator	.00363	.02442	.00300	.06808
Unknown	.00022	.00055	.00020	.00021
Parasite	--	--	--	.00001

Table 39. Comparison of mean numbers/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date May 25, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	435.0	244.2	214..	216.0
Plant tissue	17.8	366.4	34.0	79.8
Omnivore	18.4	246.0	34.4	33.8
Scavenger	--	24.0	--	822.4
Predator	7.6	57.2	11.0	207.6
Unknown	0.8	1.0	1.2	1.0
Parasite	--	0.2	--	--

Table 40. Comparison of mean biomass in g/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date May 25, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	.11999	.06461	.06106	.05266
Plant tissue	.04970	.15412	.10949	.09054
Omnivore	.01289	.32046	.04959	.03783
Scavenger	--	.01728	--	.04179
Predator	.00304	.01915	.02202	.12160
Unknown	.00055	.00096	.00114	.00089
Parasite	--	.00001	--	--

Table 41. Comparison of mean numbers/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date June 13, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	70.4	260.0	83.0	370.8
Plant tissue	14.4	368.0	26.6	311.2
Omnivore	1.4	93.8	16.8	32.4
Scavenger	0.8	77.6	0.2	65.5
Predator	3.8	31.2	3.6	191.4
Unknown	5.4	2.0	--	81.2
Plant pollen	--	0.6	--	0.2

Table 42. Comparison of mean biomass in g/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date June 13, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	.01999	.10541	.02509	.15242
Plant tissue	.09503	.18189	.10327	.11279
Omnivore	.00101	.10847	.01348	.03655
Scavenger	.00058	.00741	.00014	.00401
Predator	.01424	.02685	.01467	.24523
Unknown	.01210	.00148	--	.00762
Plant pollen	--	.00020	--	.00042

Table 43. Comparison of mean biomass/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date July 5, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	47.4	285.4	26.8	387.6
Plant tissue	2.2	71.4	6.8	68.2
Omnivore	--	33.8	0.2	10.4
Scavenger	1.0	6.2	0.8	10.4
Predator	2.8	81.6	5.0	124.2
Unknown	--	0.8	--	1.2
Parasite	0.8	4.2	1.4	2.2
Plant pollen	--	2.6	--	1.6

Table 44. Comparison of mean biomass in g/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date July 5, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	.03448	.12219	.01713	.19162
Plant tissue	.00648	.06057	.03822	.21310
Omnivore	--	.03980	.00008	.00955
Scavenger	.00004	.00429	.00017	.00106
Predator	.00151	.05805	.00553	.20754
Unknown	--	.00066	--	.00190
Parasite	.00488	.02293	.00854	.01262
Plant pollen	--	.00317	--	--

Table 45. Comparison of mean numbers/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date July 25, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	37.8	146.0	21.8	177.6
Plant tissue	18.8	107.4	17.4	73.6
Omnivore	35.8	100.4	65.6	55.4
Scavenger	--	4.6	0.2	17.8
Predator	2.2	91.6	0.8	142.4
Unknown	--	9.0	--	.800
Parasite	0.2	2.2	0.2	1.0
Plant pollen	--	1.4	0.2	0.2

Table 46. Comparison of mean biomass in g/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date July 25, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	.01396	.09373	.01568	.18109
Plant tissue	.02818	.13586	.04755	.35834
Omnivore	.02364	.13473	.05877	.08252
Scavenger	--	.00298	.00003	.00584
Predator	.00562	.02537	.00220	.12602
Unknown	--	.00537	--	.00067
Parasite	.00122	.00489	.00122	.00005
Plant pollen	--	.01078	.00019	.00686

Table 47. Comparison of mean numbers/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date August 16, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	19.0	96.2	20.4	203.6
Plant tissue	13.6	83.4	8.4	25.2
Omnivore	28.4	437.8	4.6	22.4
Scavenger	0.2	0.4	0.4	38.4
Predator	1.8	49.8	2.0	111.2
Unknown	0.2	1.2	--	--
Parasite	--	0.2	--	--
Plant pollen	0.2	--	0.2	0.4
Plant seed	--	0.2	--	--

Table 48. Comparison of mean biomass in g/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date August 16, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	.01426	.04841	.02103	.20405
Plant tissue	.03992	.11032	.03023	.10498
Omnivore	.03266	.53135	.00325	.03218
Scavenger	.00003	.00044	.00018	.01673
Predator	.00347	.02787	.00212	.10452
Unknown	.00004	.00091	--	--
Parasite	--	.00122	--	--
Plant pollen	.00042	--	.00019	.00249
Plant seed	--	.00030	--	--

Table 49. Comparison of mean numbers/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date September 6, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	21.6	133.4	24.4	191.2
Plant tissue	7.8	48.8	3.6	25.6
Omnivore	3.2	19.0	6.0	41.4
Scavenger	1.2	4.0	0.2	61.6
Predator	5.0	59.4	2.2	216.0
Unknown	--	1.4	0.2	0.6
Parasite	--	1.8	--	4.6
Plant pollen	0.4	0.4	2.2	1.0
Plant seed	--	0.2	--	0.2

Table 50. Comparison of mean biomass in g/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date September 6, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	.02186	.09032	.01031	.15352
Plant tissue	.01776	.07927	.06256	.09752
Omnivore	.00493	.02080	.00372	.05780
Scavenger	.03562	.01684	.00077	.02613
Predator	.00597	.02505	.00852	.20308
Unknown	--	.00108	.00004	.00012
Parasite	--	.00231	--	.00256
Plant pollen	.00048	.00719	.07542	.00993
Plant seed	--	.00030	--	.00030

Table 51. Comparison of mean numbers/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date October 8, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	42.2	98.6	34.0	235.0
Plant tissue	17.2	42.8	27.0	44.0
Omnivore	8.6	15.0	5.4	0.2
Scavenger	0.2	5.4	--	1.6
Predator	2.6	44.2	0.8	142.6
Unknown	--	1.4	--	0.2
Parasite	0.2	0.8	0.4	1.8
Plant seed	--	0.2	--	--

Table 52. Comparison of mean biomass in g/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date October 8, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	.02350	.03968	.01034	.24031
Plant tissue	.02980	.03458	.01750	.05147
Omnivore	.00458	.02190	.00316	.00019
Scavenger	.00077	.00366	--	.01147
Predator	.00204	.04667	.00086	.14026
Unknown	--	.00217	--	.00083
Parasite	.00004	.00032	.00005	.00061
Plant seed	--	.00030	--	--

Table 53. Comparison of mean numbers/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date December 7, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	24.4	38.6	29.4	89.8
Plant tissue	21.2	58.2	23.8	33.2
Omnivore	--	0.2	0.2	0.6
Scavenger	0.4	1.0	1.0	2.0
Predator	2.4	11.6	1.4	92.4
Unknown	--	--	--	--
Plant pollen	--	1.2	0.2	0.2
Parasite	--	--	--	1.2

Table 54. Comparison of mean biomass in g/m^2 of aboveground arthropods representing different trophic levels taken in four grassland stress treatments with a D-vac suction apparatus at the time of the first major sampling date December 7, 1973.

Feeding habit	No treatment	Water	Nitrogen	Water plus nitrogen
Plant sap	.00947	.01562	.01223	.10077
Plant tissue	.02520	.04902	.01851	.01368
Omnivore	--	.00019	.00019	.00058
Scavenger	.00154	.00385	.00385	.00770
Predator	.00278	.01223	.00015	.15601
Unknown	--	--	--	--
Plant pollen	--	.02782	.00464	.00464
Parasite	--	--	--	.00115

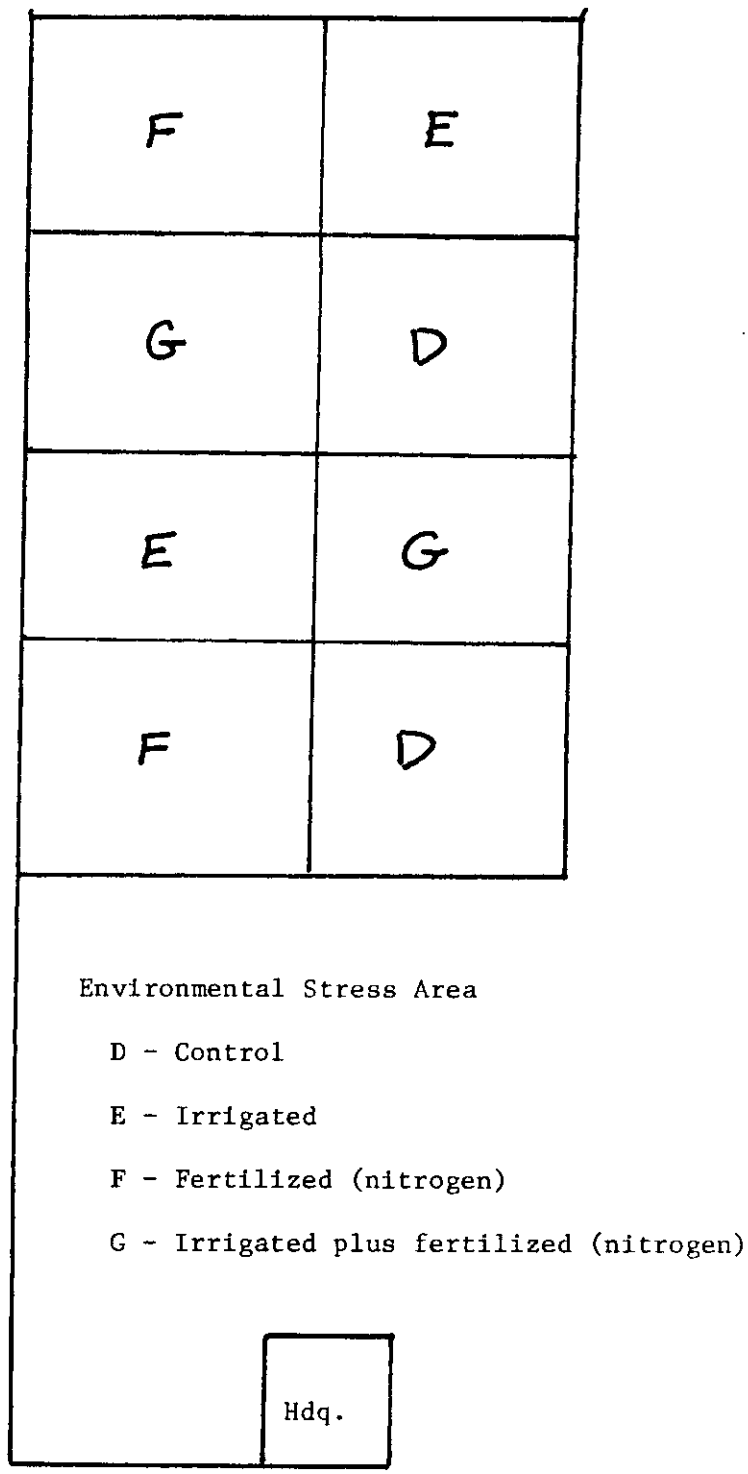

Fig. 1. Approximate location of aboveground insect sampling areas, 1973.

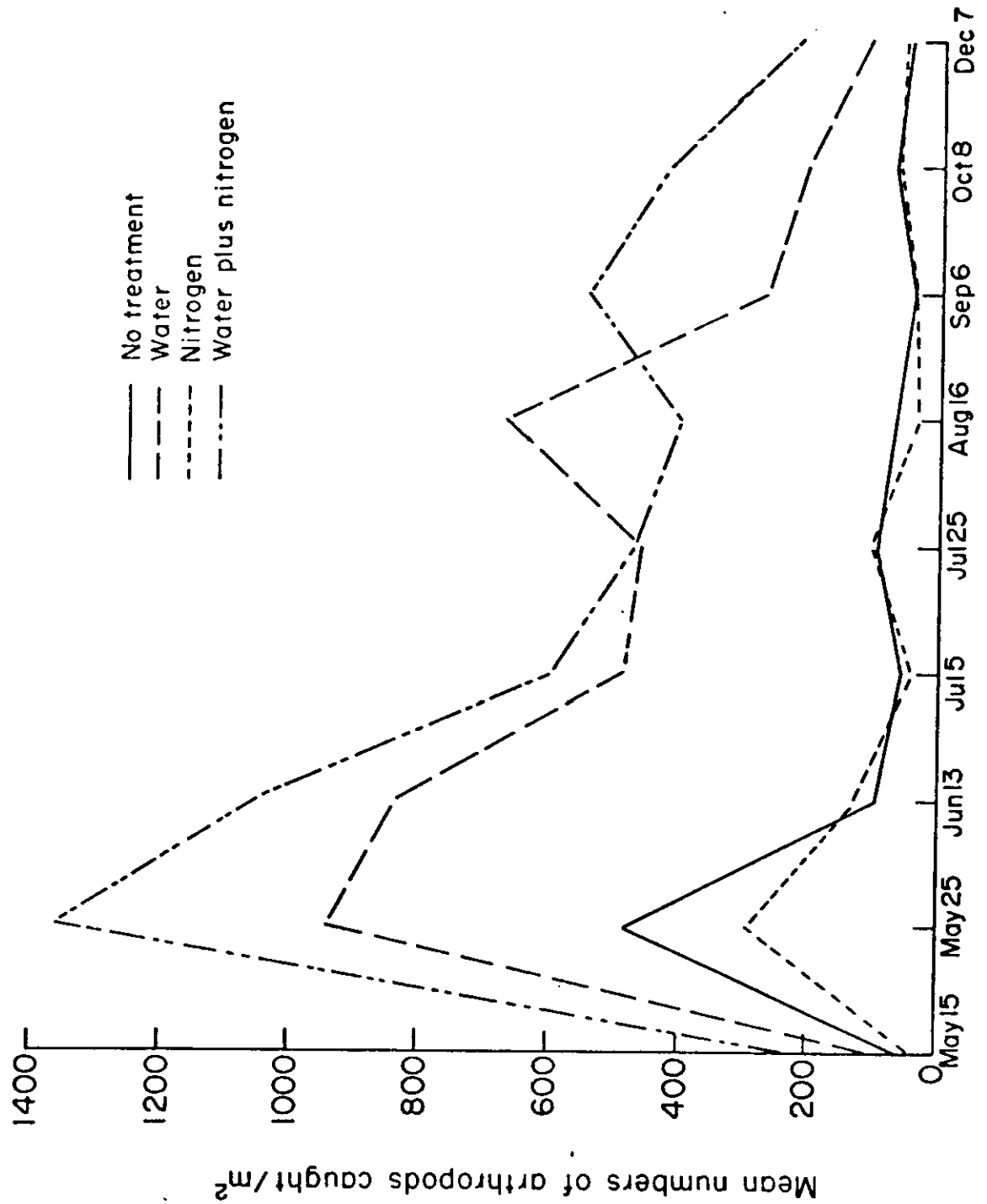

Fig. 2. Comparison of effects of four stress treatments on populations of arthropods on the Pawnee Site (1973), as expressed in mean numbers per meter squared, collected with a D-vac suction apparatus on ten major sampling dates.

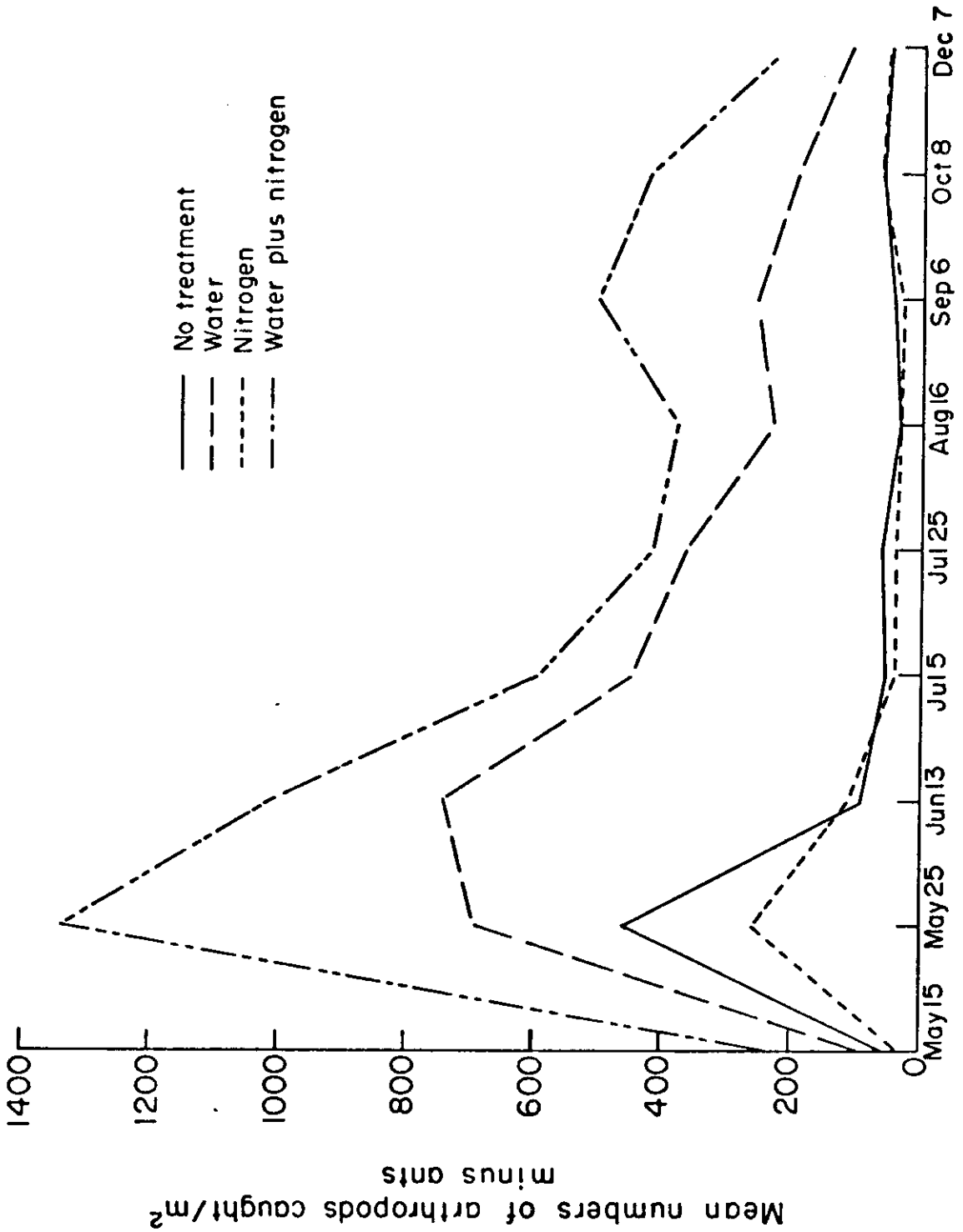

Fig. 3. Comparison of effects of four stress treatments on populations of arthropods on the Pawnee Site (1973), expressed in mean numbers per meter squared, collected with a D-vac suction apparatus on ten major sampling dates, but with ants (Formicidae) removed from the samples.

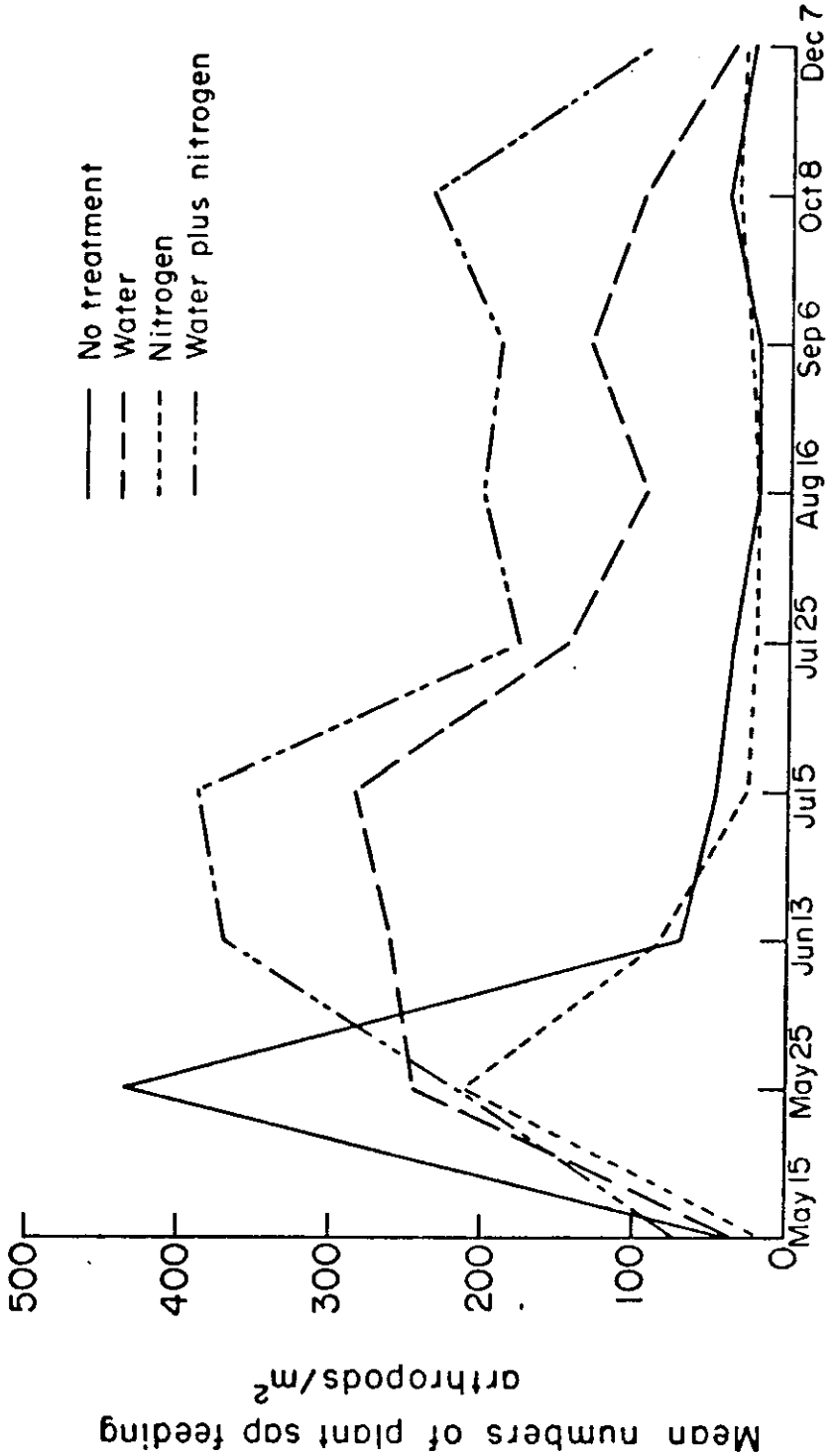

Fig. 4. Effect of four stress treatments on populations of plant sap feeding arthropods on the Pawnee Site (1973), expressed in mean numbers per meter squared, collected with a D-vac suction apparatus on ten major sampling dates.

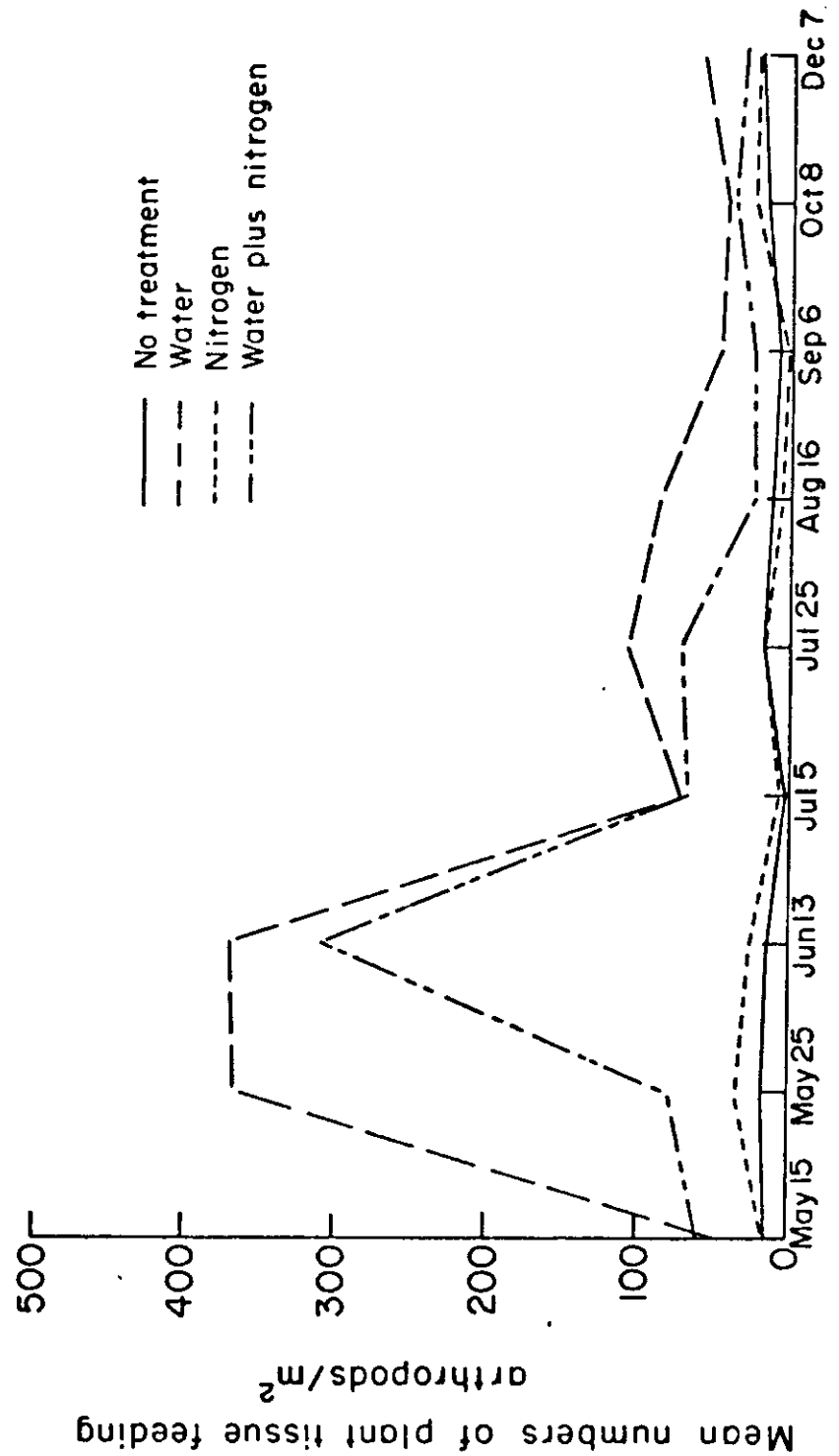

Fig. 5. Effect of four stress treatments on populations of plant tissue feeding arthropods on the Pawnee Site (1973), expressed in mean numbers per meter squared, collected with a D-vac suction apparatus on ten major sampling dates.

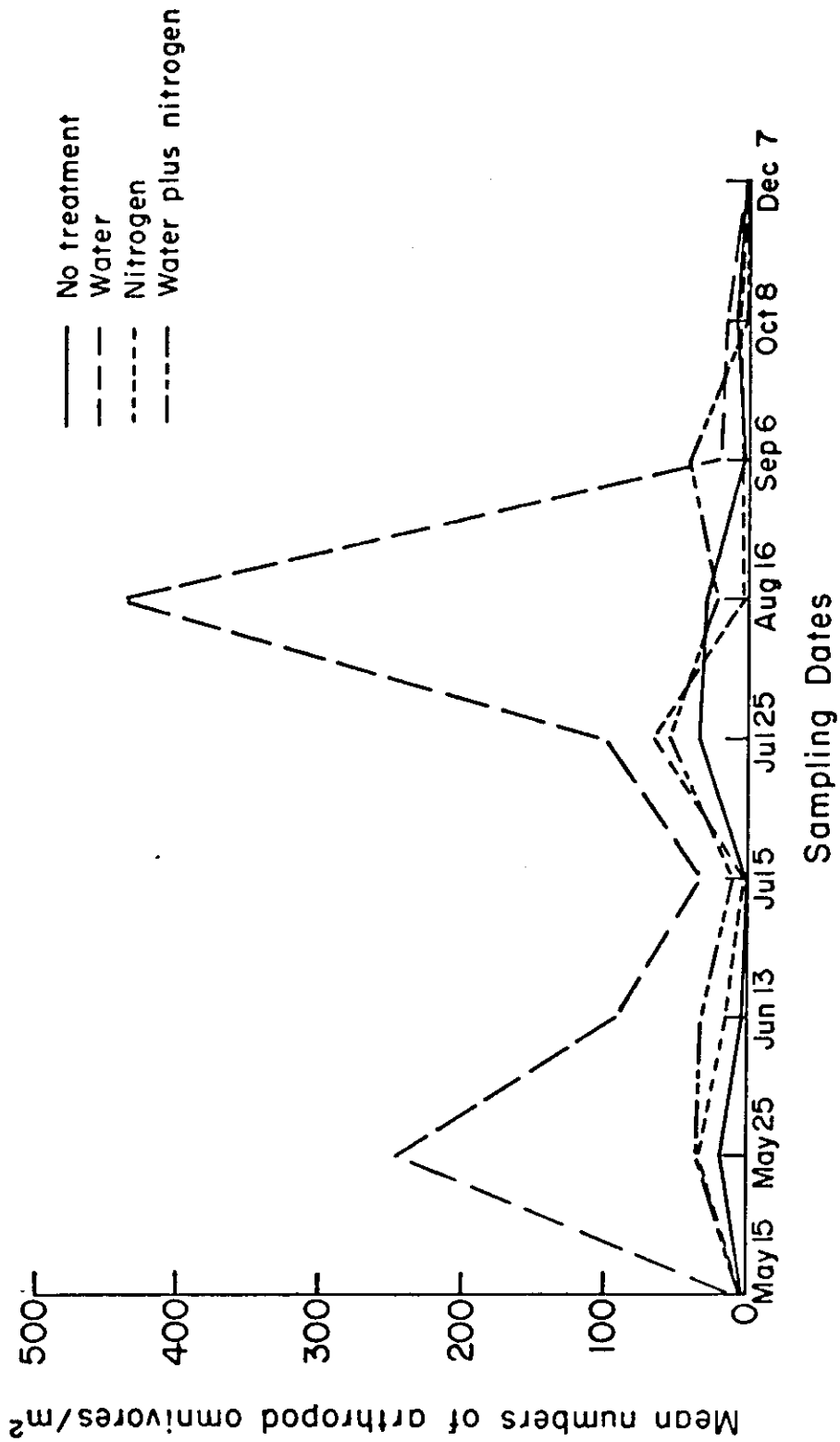

Fig. 6. Effect of four stress treatments on populations of arthropod omnivores on the Pawnee Site (1973), expressed in mean numbers per meter squared, collected with a D-vac suction apparatus on ten major sampling dates.

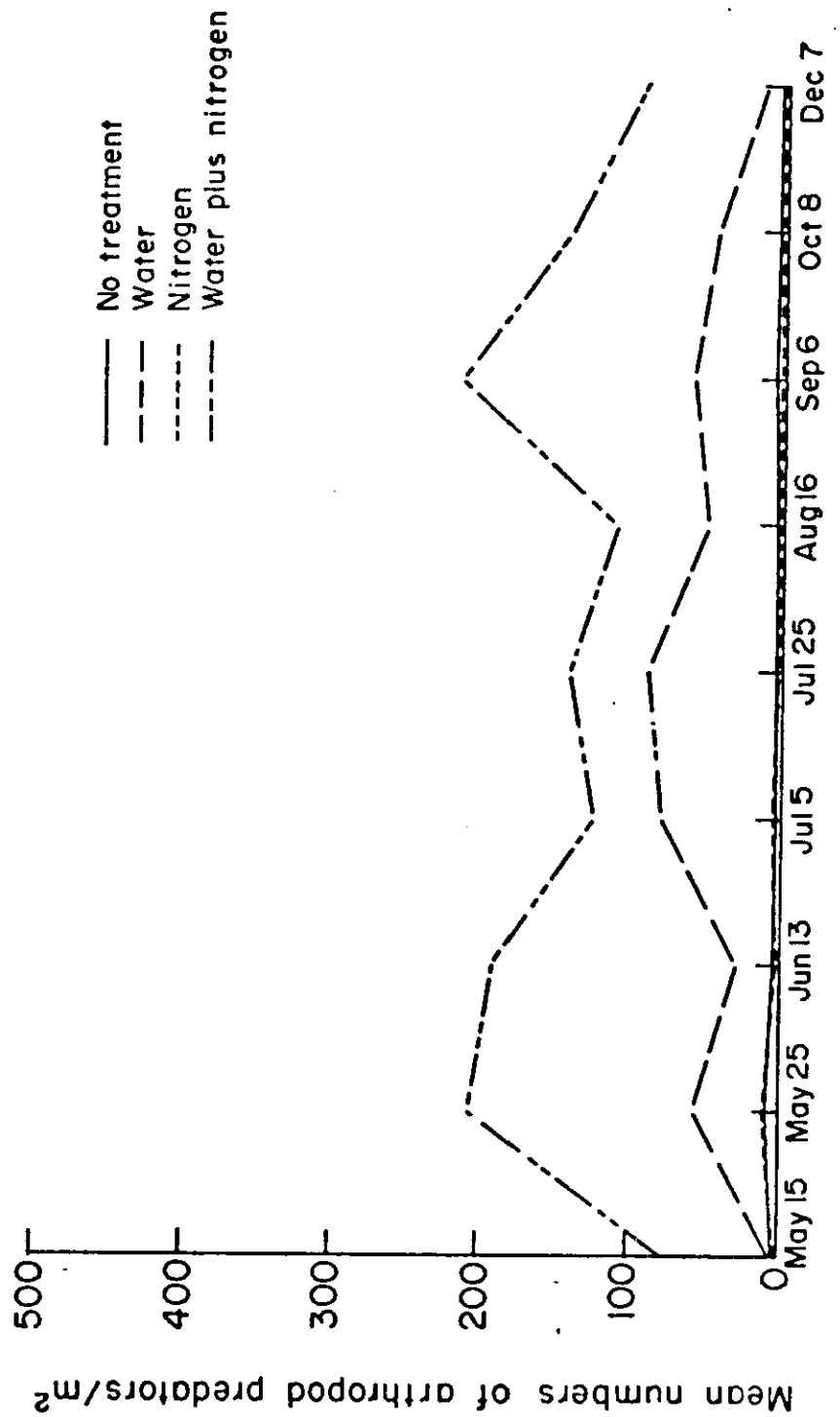

Fig. 7. Effect of four stress treatments on populations of arthropod predators on the Pawnee Site (1973), expressed in mean numbers per meter squared, collected with a D-vac suction apparatus on ten major sampling dates.

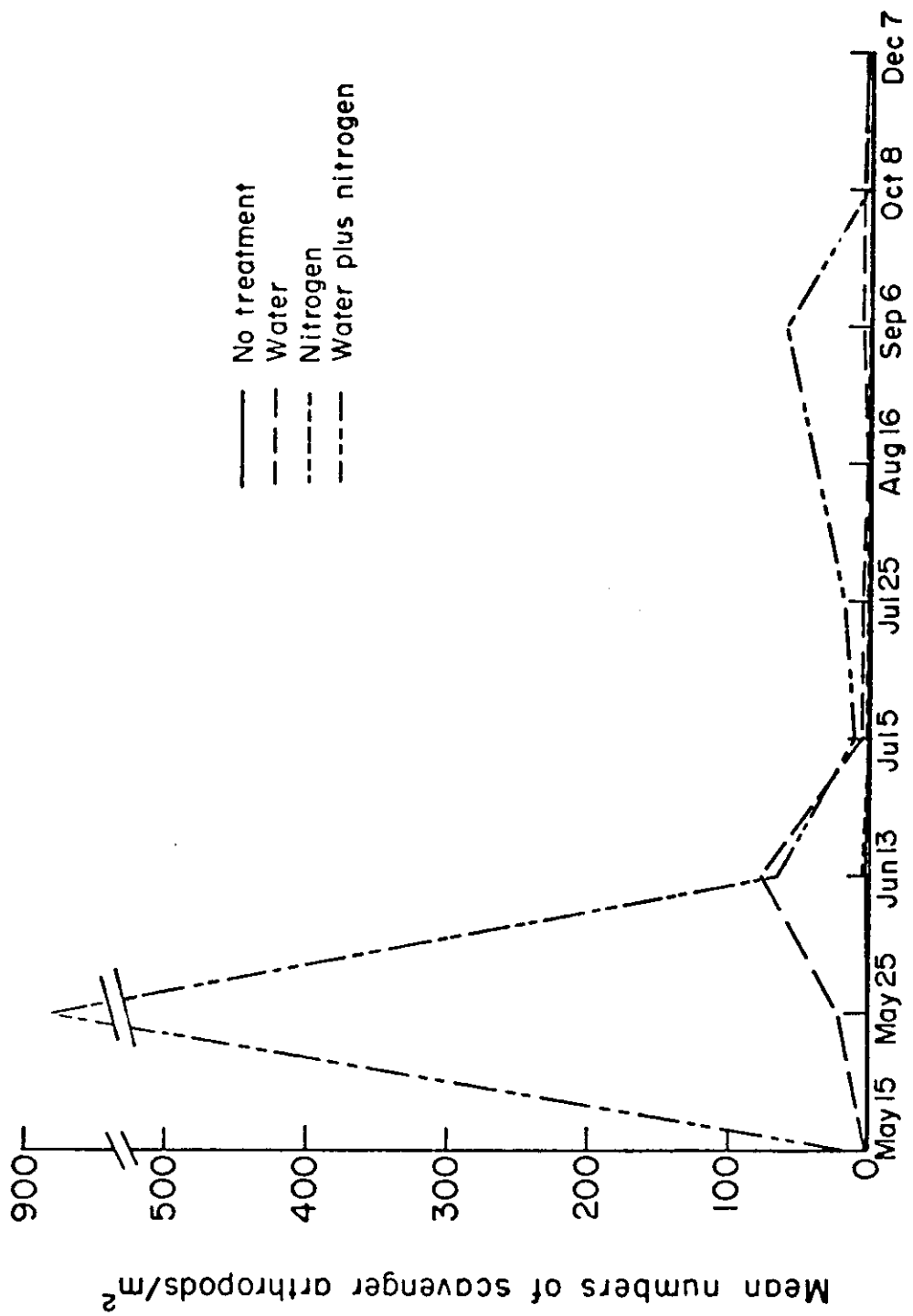

Fig. 8. Effect of four stress treatments on populations of scavenger arthropods on the Pawnee Site (1973), expressed in mean numbers per meter squared, collected with a D-vac suction apparatus on ten major sampling dates.

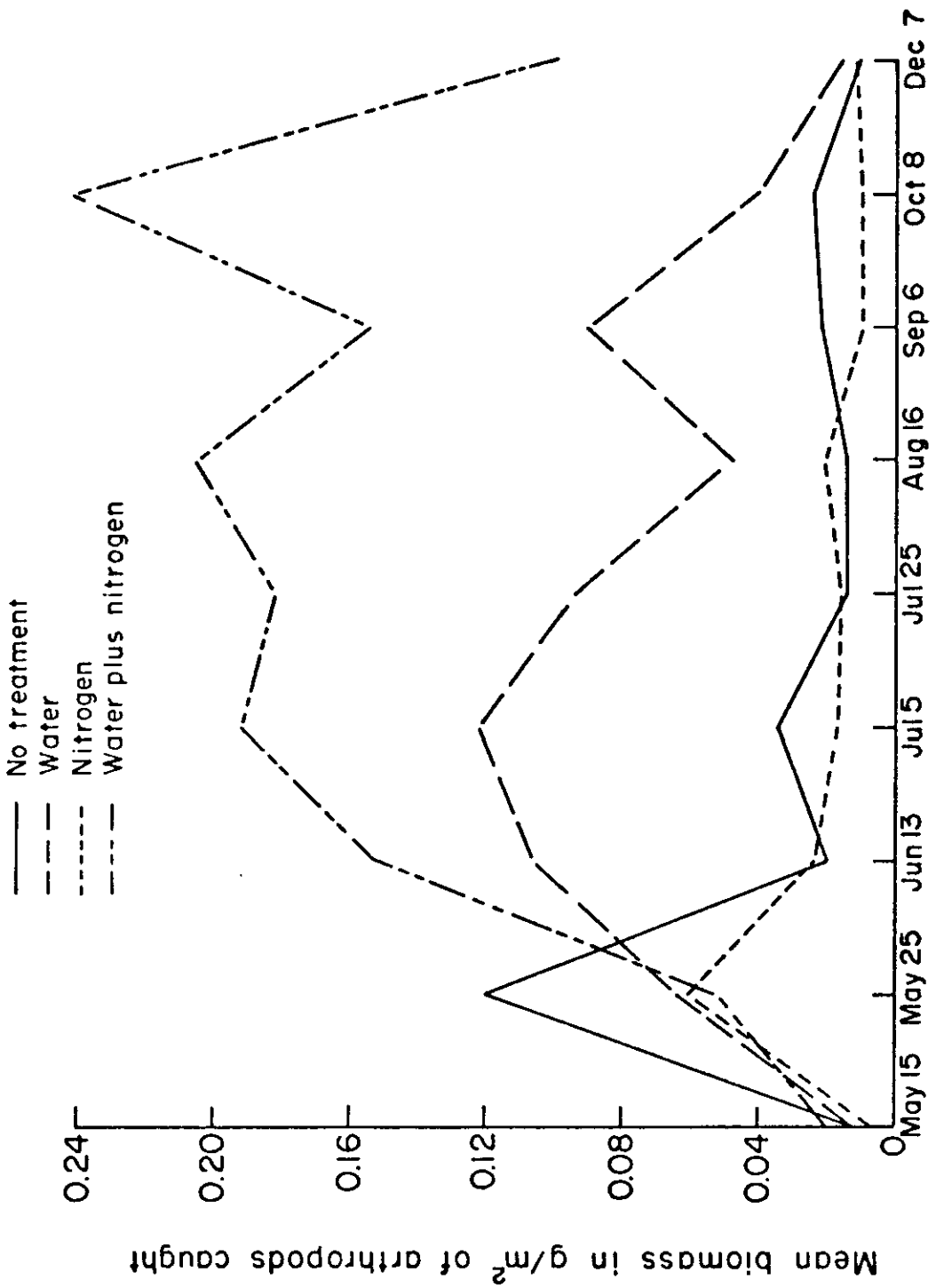

Fig. 9. Effect of four stress treatments on biomass in grams per meter squared of plant sap feeding arthropods on the Pawnee Site (1973), collected with a D-vac suction apparatus on ten major sampling dates.

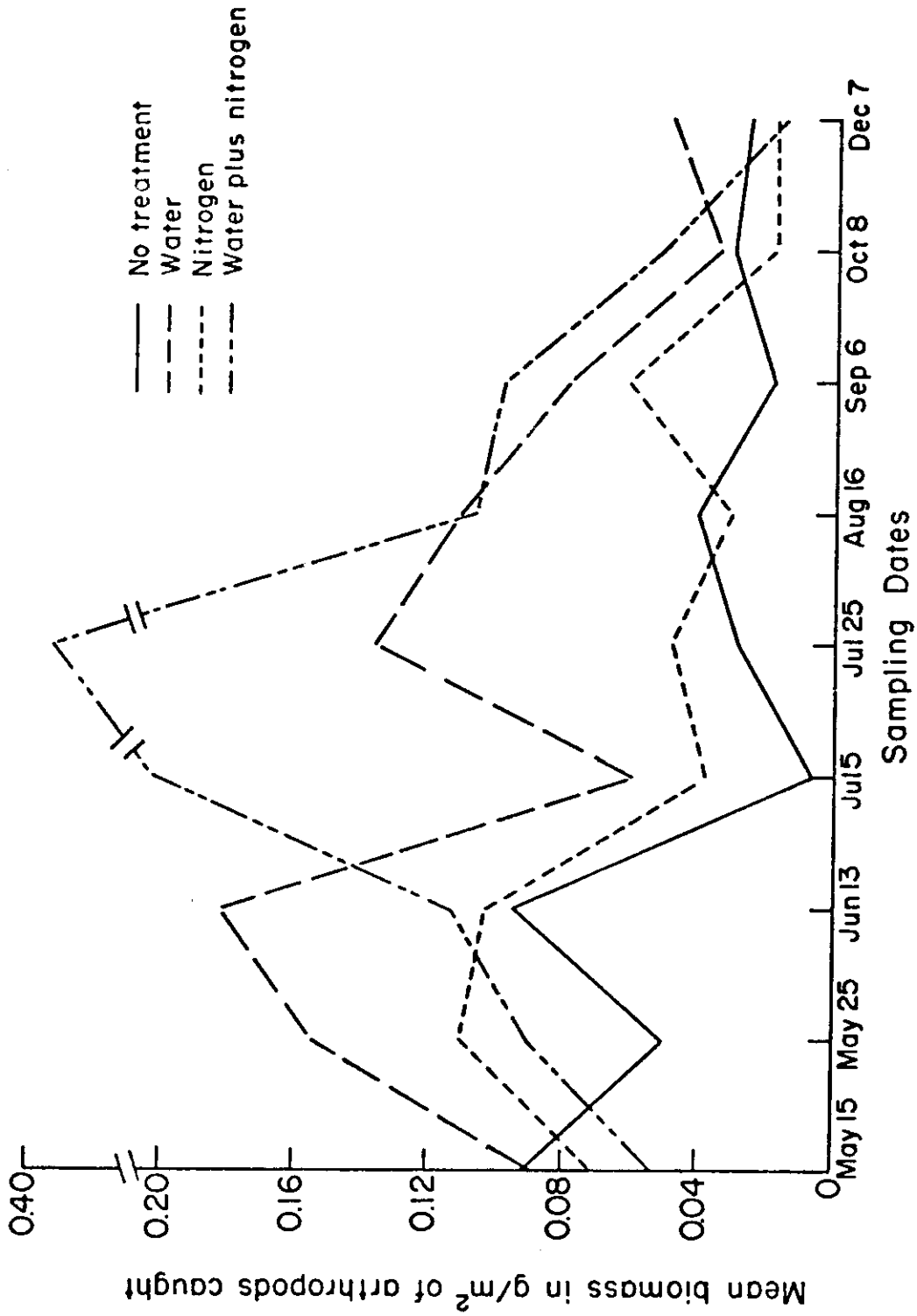

Fig. 10. Effect of four stress treatments on biomass in grams per meter squared of plant tissue feeding arthropods on the Pawnee Site (1973), collected with a D-vac suction apparatus on ten major sampling dates.

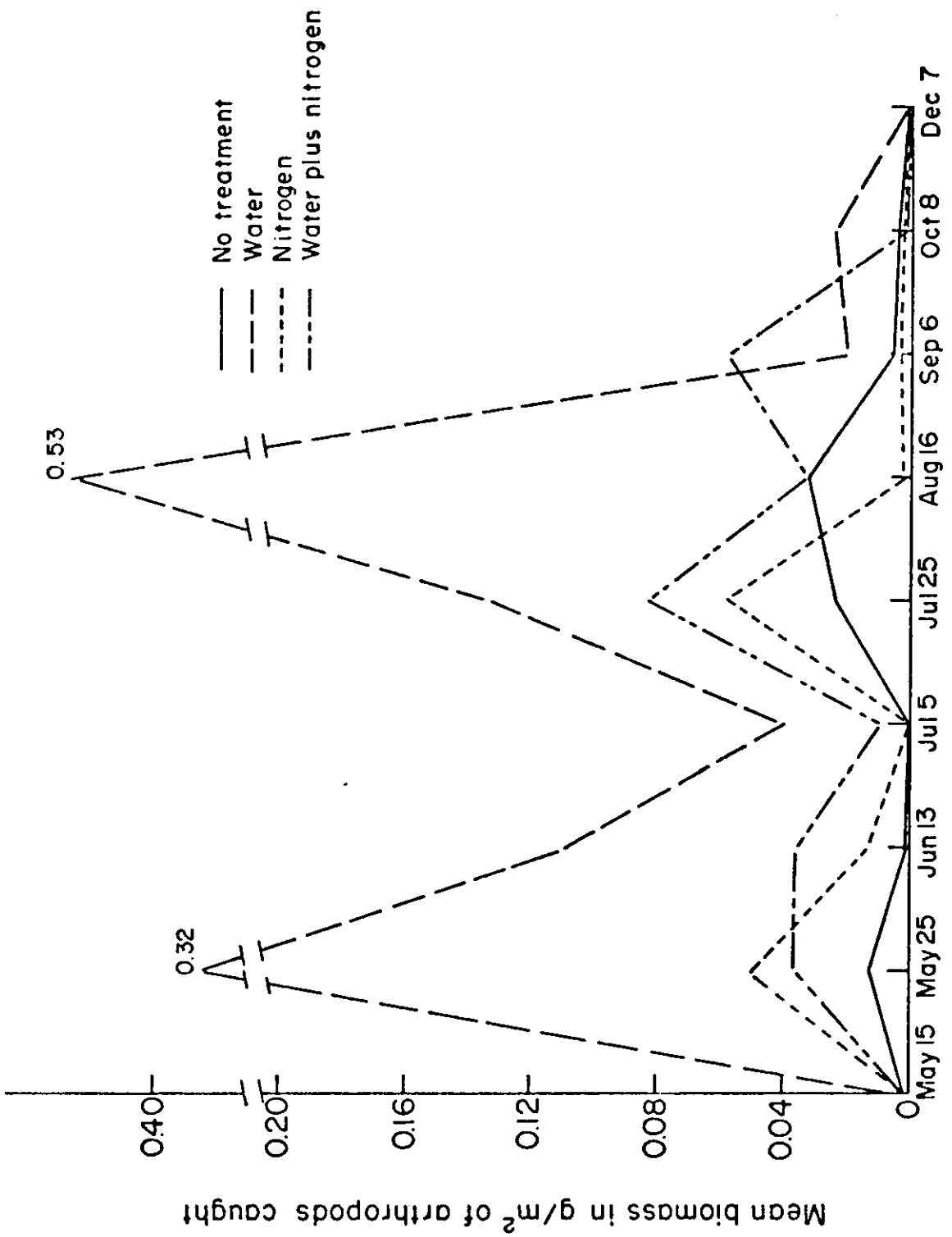

Fig. 11. Effect of four stress treatments on biomass in grams per meter squared of arthropod omnivores on the Pawnee Site (1973), collected with a D-vac suction apparatus on ten major sampling dates.

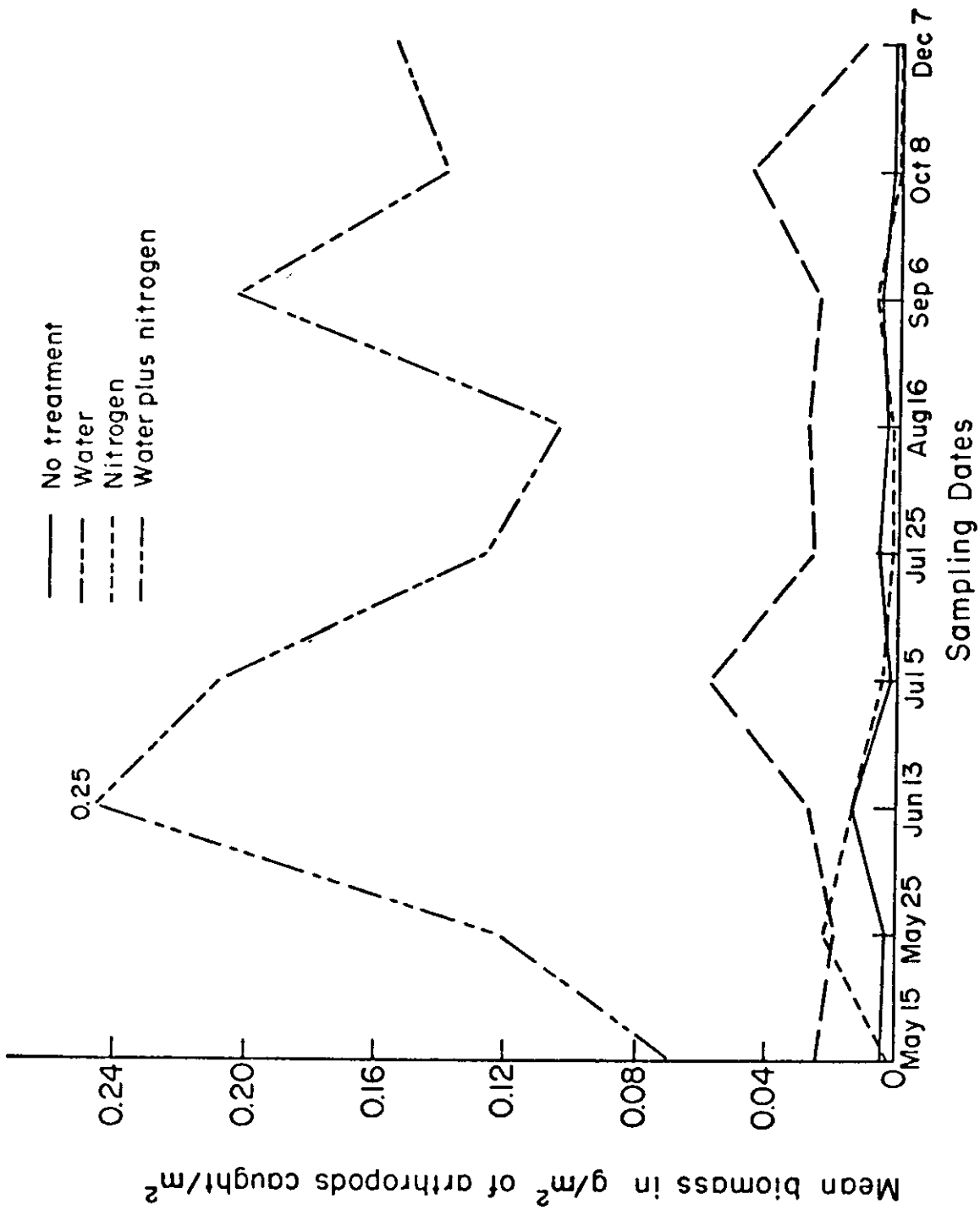

Fig. 12. Effect of four stress treatments on biomass in grams per meter squared of arthropod predators on the Pawnee Site (1973), collected with a D-vac suction apparatus on ten major sampling dates.

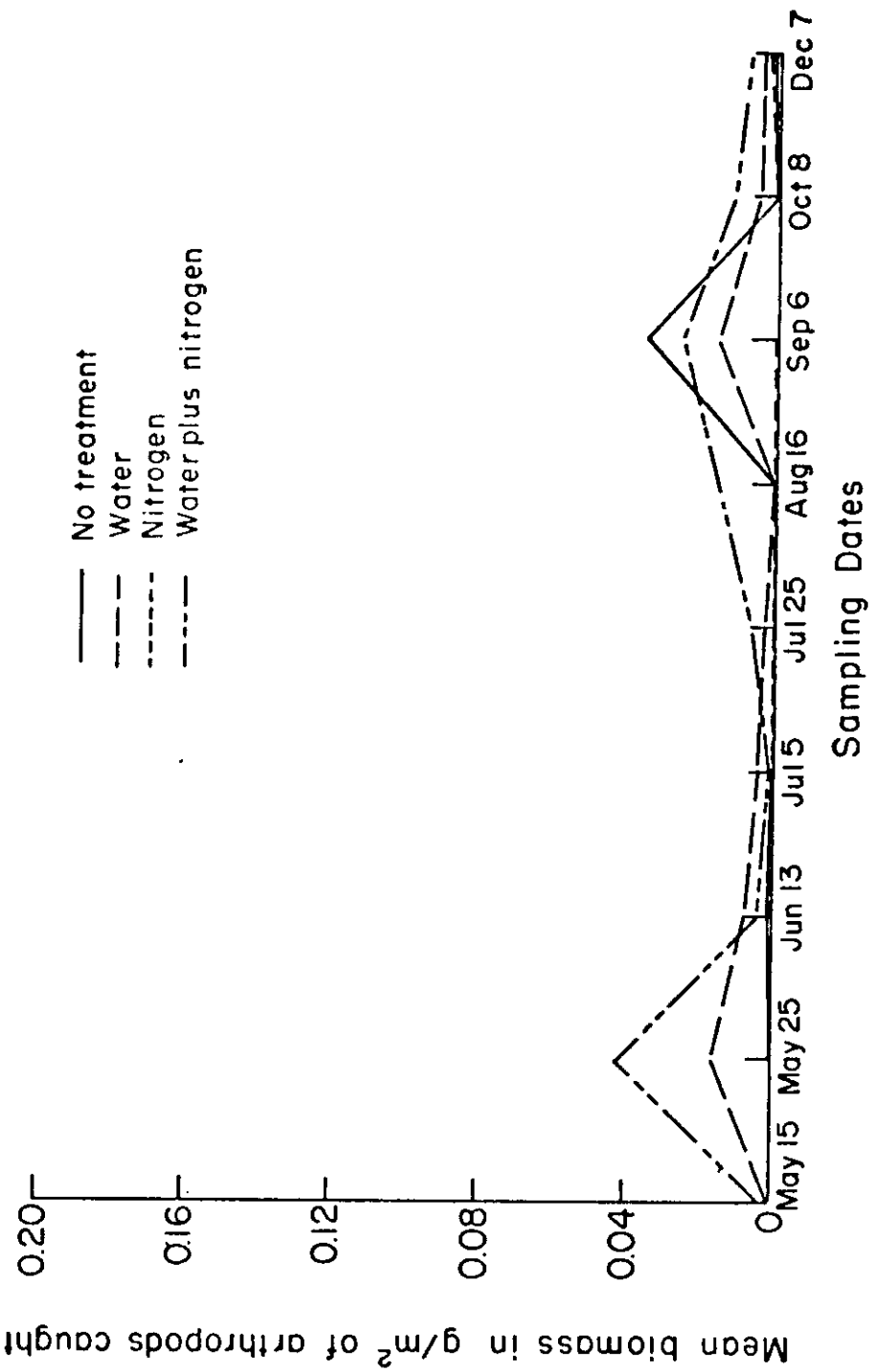

Fig. 13. Effect of four stress treatments on biomass in grams per meter squared of scavenger arthropods on the Pawnee Site (1973), collected with a D-vac suction apparatus on ten major sampling dates.

APPENDIX I.

TROPHIC GROUPINGS OF GRASSLAND ARTHROPODS

Code	Trophic Group
0	Unknown
1	Plant feeding (tissue)
2	Plant feeding (sap)
3	Plant feeding (pollen and nectar)
4	Plant feeding (seed)
5	Predators
6	Parasites
7	Omnivores
8	Saprophages: reducers of plants, feces, carrion and microflora
9	Non-feeding stages

ORDER	FAMILY	LARVAE	ADULT
ACARINA			
ARANEIDA		5	5
ARANEIDA	AGELENIDAE	5	5
ARANEIDA	ARANEIDAE	5	5
ARANEIDA	ARGIOPIDAE	5	5
ARANEIDA	CLUBIONIDAE	5	5
ARANEIDA	DICTYNIDAE	5	5
ARANEIDA	LIGUETIDAE	5	5
ARANEIDA	GNAPHOSIDAE	5	5
ARANEIDA	LINYPHIIDAE	5	5
ARANEIDA	LYCOSIDAE	5	5
ARANEIDA	OXYOPIDAE	5	5
ARANEIDA	SALTICIDAE	5	5
ARANEIDA	THERIDIIDAE	5	5
ARANEIDA	THOMISIDAE	5	5
CHELONETHIDA		5	5
CHILOPODA		5	5
COLEOPTERA			
COLEOPTERA	ANOBIIDAE	1	1
COLEOPTERA	ANTHICIDAE	1	3
COLEOPTERA	ANTHRIBIDAE		
COLEOPTERA	BOSTRICHIDAE	1	1
COLEOPTERA	BRUCHIDAE	4	3
COLEOPTERA	BUPRESTIDAE	1	3
COLEOPTERA	CANTHARIDAE	5	3
COLEOPTERA	CARABIDAE		
	AMARINI, HARPALINI	5	1
	OTHER CARABIDAE	5	5
COLEOPTERA	CERAMBYCIDAE		
COLEOPTERA	CHRYSOMELIDAE	1	3
COLEOPTERA	CICINDELIDAE	1	1
COLEOPTERA	CISIDAE	5	5
COLEOPTERA	CLERIDAE	6	6
COLEOPTERA	COCCINELLIDAE	5	5
COLEOPTERA	CRYPTOPHAGIDAE	6	6
COLEOPTERA	CUCUJIDAE	5	5
COLEOPTERA	CURCULIONIDAE	1	1
COLEOPTERA	CURYDIIDAE		
COLEOPTERA	DASYTIDAE	5	5
COLEOPTERA	DERMESTIDAE	6	6
COLEOPTERA	DYTISCIDAE	5	5
COLEOPTERA	ELATERIDAE	1	1
COLEOPTERA	EROTYLIDAE		6
COLEOPTERA	EUCNEMIDAE		
COLEOPTERA	HETEROCERIDAE	6	6
COLEOPTERA	HISTERIDAE	5	5
COLEOPTERA	HYDROPHILIDAE	5	6
COLEOPTERA	LAMPYRIDAE	5	3
COLEOPTERA	LATHRIDIIDAE	6	6
COLEOPTERA	LEIODIDAE	6	6
COLEOPTERA	LEPTODIRIDAE		6
COLEOPTERA	LIMNEBIIDAE		
COLEOPTERA	MALACHIIDAE	5	5
COLEOPTERA	MELANDRYIDAE		
COLEOPTERA	MELOIDAE	5	1

ORDER	FAMILY	LARVAE	ADULT
COLEOPTERA	MELYRIDAE		
COLEOPTERA	MORDELLIDAE	1	3
COLEOPTERA	MYCETOPHAGIDAE	8	8
COLEOPTERA	NITIDULIDAE	8	3
COLEOPTERA	ORTHOPERIDAE	8	8
COLEOPTERA	PHALACRIDAE	1	1
COLEOPTERA	PSELAPHIDAE	5	5
COLEOPTERA	PTILIIDAE	8	8
COLEOPTERA	PTINIDAE	8	8
COLEOPTERA	SCAPHIDIIDAE	8	8
COLEOPTERA	SCARABAEIDAE	1	1
COLEOPTERA	SCOLYTIDAE	1	1
COLEOPTERA	SCYDMAENIDAE		
COLEOPTERA	SILPHIDAE	8	8
COLEOPTERA	SILVANIDAE		
COLEOPTERA	STAPHYLINIDAE	5	5
COLEOPTERA	TENEBRIONIDAE	1	8
COLEOPTERA	THROSCIDAE		
COLLEMBOLA			
COLLEMBOLA	ENTOMOBRYIDAE	8	8
COLLEMBOLA	PODURIDAE	8	8
COLLEMBOLA	SMINTHURIDAE	1	1
DERMAPTERA		8	8
DIPLOPODA		8	8
DIPTERA			
DIPTERA	AGROMYZIDAE	1	1
DIPTERA	ANTHOMYIIDAE	1	3
DIPTERA	ASILIDAE	5	5
DIPTERA	BIBIONIDAE	1	3
DIPTERA	BOMBYLIIDAE	5	3
DIPTERA	CALLIPHORIDAE	8	3
DIPTERA	CECIDOMYIIDAE	1	3
DIPTERA	CERATOPOGONIDAE	8	6
DIPTERA	CHAOBORIDAE		
DIPTERA	CHLOROPIDAE	1	3
DIPTERA	CHIRONOMIDAE	1	3
DIPTERA	CONOPIDAE	6	3
DIPTERA	CULICIDAE	8	6
DIPTERA	DOLICHOPODIDAE	5	5
DIPTERA	DROSOPHILIDAE	8	8
DIPTERA	EMPIDIDAE	5	5
DIPTERA	EPHYDRIDAE		
DIPTERA	HELEOMYZIDAE		
DIPTERA	MUSCIDAE	8	3
DIPTERA	MYCETOPHILIDAE	8	3
DIPTERA	OTITIDAE	8	
DIPTERA	PHORIDAE	8	3
DIPTERA	PTYCHOPTERIDAE	6	
DIPTERA	PSYCHODIDAE	8	6
DIPTERA	SARCOPHAGIDAE	0	3
DIPTERA	SCATOPSIDAE	8	3
DIPTERA	SCENOPINIDAE	5	
DIPTERA	SCIARIDAE	8	
DIPTERA	SCIOMYZIDAE	6	
DIPTERA	SEPSIDAE	8	3

ORDER	FAMILY	LARVAE	ADULT
DIPTERA	SIMULIIDAE	6	6
DIPTERA	SYRPHIDAE	5	3
DIPTERA	TABANIDAE	5	6
DIPTERA	TACHINIDAE	6	3
DIPTERA	TEPHRITIDAE	1	3
DIPTERA	THEREVIDAE	5	
DIPTERA	TIPULIDAE	1	
EPHEMEROPTERA		1	4
EPHEMEROPTERA	BAETIDAE	1	4
HEMIPTERA			
HEMIPTERA	ANTHOCORIDAE	5	5
HEMIPTERA	COREIDAE	2	2
HEMIPTERA	CORIMELAENIDAE	2	2
HEMIPTERA	CORISCIDAE	2	2
HEMIPTERA	CORIXIDAE		
HEMIPTERA	CORIZIDAE	2	2
HEMIPTERA	CYDNIDAE	2	2
HEMIPTERA	GERRIDAE		
HEMIPTERA	LYGAEIDAE	2	2
HEMIPTERA	MIRIDAE	2	2
HEMIPTERA	NABIDAE	5	5
HEMIPTERA	NEIDIDAE	2	2
HEMIPTERA	NOTONECTIDAE	5	5
HEMIPTERA	PENTATOMIDAE	2	2
HEMIPTERA	PHYMATIDAE	5	5
HEMIPTERA	PIESMIDAE	2	2
HEMIPTERA	PLOIARIIDAE	5	5
HEMIPTERA	PYRRHOCORIDAE	2	2
HEMIPTERA	REDUVIIDAE	5	5
HEMIPTERA	SCUTELLERIDAE	2	2
HEMIPTERA	TINGIDAE	2	2
HOMOPTERA		2	2
HOMOPTERA	APHIDIDAE	2	2
HOMOPTERA	CERCOPIDAE	2	2
HOMOPTERA	CICADELLIDAE	2	2
HOMOPTERA	CICADIDAE	2	2
HOMOPTERA	CIXIIDAE	2	2
HOMOPTERA	COCCIDAE	2	2
HOMOPTERA	DACTYLOPIIDAE	2	2
HOMOPTERA	DELPHACIDAE	2	2
HOMOPTERA	DICTYOPHARIDAE	2	2
HOMOPTERA	ERIOSOMATIDAE	2	2
HOMOPTERA	FULGORIDAE	2	2
HOMOPTERA	ISSIDAE	2	2
HOMOPTERA	MARGARODIDAE	2	2
HOMOPTERA	MEMBRACIDAE	2	2
HOMOPTERA	PSEUDOCOCCIDAE	2	2
HOMOPTERA	PSYLLIDAE	2	2
HYMENOPTERA			
HYMENOPTERA	ANDRENIDAE	3	3
HYMENOPTERA	ANTHOPHORIDAE	3	3
HYMENOPTERA	APIDAE	3	3
HYMENOPTERA	ARGIDAE	1	0
HYMENOPTERA	BETHYLIDAE	6	3
HYMENOPTERA	BRACONIDAE	6	3
HYMENOPTERA	CERAPHRONIDAE	6	3

ORDER	FAMILY	LARVAE	ADULT
HYMENOPTERA	CYNIPIDAE		
HYMENOPTERA	CHALCIDIDAE	6	3
HYMENOPTERA	CHALCIDOIDEA	6	3
HYMENOPTERA	DIAPRIIDAE	6	3
HYMENOPTERA	DRYININDAE		
HYMENOPTERA	ENCYRTIDAE	6	3
HYMENOPTERA	EUCHARITIDAE	6	3
HYMENOPTERA	EULOPHIDAE	6	3
HYMENOPTERA	EUPELMIDAE		6
HYMENOPTERA	EURYTOMIDAE	1	3
HYMENOPTERA	FORMICIDAE		7
HYMENOPTERA	HALICTIDAE	3	3
HYMENOPTERA	ICHNEUMONIDAE	6	3
HYMENOPTERA	ICHNEUMONOIDEA	6	3
HYMENOPTERA	MUTILLIDAE	6	3
HYMENOPTERA	MYMARIDAE	6	
HYMENOPTERA	PERILAMPIDAE		
HYMENOPTERA	PLATYGASTERIDAE	6	3
HYMENOPTERA	POMPILIDAE	6	3
HYMENOPTERA	PROCTOTRUPIDAE	6	3
HYMENOPTERA	PROCTOTRUPOIDEA	6	3
HYMENOPTERA	PTEROMALIDAE	6	3
HYMENOPTERA	SCELIONIDAE	6	3
HYMENOPTERA	SPHECIDAE	5	3
HYMENOPTERA	TENTHREDINIDAE	1	
HYMENOPTERA	THYSANIDAE	6	3
HYMENOPTERA	TIPHIIDAE	6	3
HYMENOPTERA	TRICHOGRAMMATIDAE	6	
HYMENOPTERA	VESPIDAE		5
ISOPTERA		8	8
ISOPTERA	RHINOTERMITIDAE	8	8
ISOPTERA	TERMITIDAE	8	8
LEPIDOPTERA		1	3
LEPIDOPTERA	AMATIDAE	1	3
LEPIDOPTERA	ARCTIIDAE	1	3
LEPIDOPTERA	COLEOPHORIDAE	1	3
LEPIDOPTERA	ELACHISTIDAE	1	3
LEPIDOPTERA	GELECHIIDAE	1	3
LEPIDOPTERA	GEOMETRIDAE	1	3
LEPIDOPTERA	HELIODINIDAE	1	3
LEPIDOPTERA	LYCAENIDAE		1
LEPIDOPTERA	NOCTUIDAE	1	3
LEPIDOPTERA	NYMPHALIDAE	1	3
LEPIDOPTERA	PHALONIIDAE	1	3
LEPIDOPTERA	PIERIDAE	1	3
LEPIDOPTERA	PSYCHIDAE	1	3
LEPIDOPTERA	PYRALIDAE	1	3
LEPIDOPTERA	SPHINGIDAE	1	3
LEPIDOPTERA	TINEIDAE	1	3
LEPIDOPTERA	TORTRICIDAE	1	3
LEPIDOPTERA	YPONOMEUTIDAE	1	3
LITHOBIOMORPHA		5	5
MECOPTERA		5	5
MECOPTERA	PANORPIDAE		
NEUROPTERA		5	5

APPENDIX II

FIELD DATA

Aboveground invertebrate data collected at the Pawnee Site were recorded on form NREL-30. An additional code was recorded on the form (column 68) to indicate whether the arthropod was caught in the first-stage vacuum or in the second-stage vacuum (code 5 = first-stage vacuum; code 4 = second-stage vacuum). These data are stored as Grassland Biome data set A2U30ØB with a format slightly expanded from the original recorded data form. Dry weight is in columns 56 to 63; number weighed is in columns 64 to 68; the D-vac code is in column 70; a sample date identifier is in columns 76 to 80. A sample data form and an example of the data are attached.

IBP

GRASSLAND BIOME

U.S. INTERNATIONAL BIOLOGICAL PROGRAM

FIELD DATA SHEET - INVERTEBRATE

DATA TYPE	SITE	INITIALS	DATE			TREATMENT	REPLICATE	PLOT SIZE	QUADRAT	TROPHIC	HOST	ORDER	FAMILY	GENUS	SPECIES	SUBSPECIES	LIFE STAGE	TOTAL NO.	DRY WT.	NO. WEIGH
			Day	Mo	Yr															

DATA TYPE

01 Aboveground Biomass
02 Litter
03 Belowground Biomass
10 Vertebrate - Live Trapping
11 Vertebrate - Snap Trapping
12 Vertebrate - Collection
20 Avian Flush Census
21 Avian Road Count
22 Avian Road Count Summary
23 Avian Collection - Internal
24 Avian Collection - External
25 Avian Collection - Plumage
30 Invertebrate
40 Microbiology - Decomposition
41 Microbiology - Nitrogen
42 Microbiology - Biomass
43 Microbiology - Root Decomposition
44 Microbiology - Respiration

SITE

01 Ale
02 Bison
03 Bridger
04 Cottonwood
05 Dickinson
06 Hays
07 Hopland
08 Jornada
09 Osage
10 Pantex
11 Pawnee

TROPHIC

0 Unknown
1 Plant feeding (tissue)
2 Plant feeding (sap)
3 Plant feeding (pollen and nectar)
4 Plant feeding (seed)
5 Predator
6 Parasitoid
7 Parasite
8 Scavenger
9 Non-feeding stage

TREATMENT

1 Ungrazed
2 Lightly grazed
3 Moderately grazed
4 Heavily grazed
5 Grazed 1969, ungrazed 1970
6
7
8
9

LIFE STAGE

00 Undetermined
10 Adult
20 Pupae
30 Egg
40 Nymph or Larva
41 Nymph or Larva, early
42 Nymph or Larva, middle
43 Nymph or Larva, late
50 Instar
51 Instar, 1st
52 Instar, 2nd
53 Instar, 3rd

*** EXAMPLE OF DATA ***

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890

3111RJL17 57301.50021 2    HOMOCICI GI LA  40     1.  .00020  1. 5    ESA 2
3111RJL17 57301.50021 2    HEMILYGA NY SP  40    27.  .00022  1. 4    ESA 2
3111RJL17 57301.50021 2    HEMILYGA BL LE  40     9.  .00013  1. 4    ESA 2
3111RJL17 57301.50021 2    HEMILYGA CR DI  10    15.  .00045  1. 4    ESA 2
3111RJL17 57301.50021 1    COLEPHAL PH SP  10     2.  .00022  1. 4    ESA 2
3111RJL17 57301.50021 1    COLECURC CA CR  10     1.  .00063  1. 4    ESA 2
3111RJL17 57301.50021 1    COLECHRY    01  40     7.  .00120  1. 4    ESA 2
3111RJL17 57301.50021 1    COLETENE BL SP  10     1.  .00385  1. 4    ESA 2
3111RJL17 57301.50021 1    COLECARA SE PL  10     2.  .00193  1. 4    ESA 2
3111RJL17 57301.50021 1    COLECHRY CH SP  10     1.  .00071  1. 4    ESA 2
3111RJL17 57301.50021 5    COLEMIST AE FI  10     1.  .00358  1. 4    ESA 2
3111RJL17 57301.50021 1    COLECARA AN SP  40     1.  .00167  1. 4    ESA 2
3111RJL17 57301.50021 2    HEMITING    09  10     1.  .00070  1. 4    ESA 2
3111RJL17 57301.50022 2    HEMILYGA NY SP  40    24.  .00022  1. 5    ESA 2
3111RJL17 57301.50022 2    HEMILYGA NY SP  10     1.  .00042  1. 5    ESA 2
3111RJL17 57301.50022 2    HOMOCICI AT MA  10     2.  .00036  1. 5    ESA 2
3111RJL17 57301.50022 2    HOMOCICI AC SP  10     4.  .00033  1. 5    ESA 2
3111RJL17 57301.50022 7    MYMEFORM MO MI  10     1.  .00036  1. 5    ESA 2
3111RJL17 57301.50022 2    HEMILYGA NY SP  40     1.  .00022  1. 4    ESA 2
3111RJL17 57301.50022 2    HEMILYGA BL LE  40     6.  .00013  1. 4    ESA 2
3111RJL17 57301.50022 1    COLECURC    57  10     2.  .01644  1. 4    ESA 2
3111RJL17 57301.50023 2    HEMILYGA NY SP  40     2.  .00022  1. 5    ESA 2
3111RJL17 57301.50023 2    HOMOCICI AT SP  40     1.  .00046  1. 5    ESA 2
3111RJL17 57301.50023 1    COLETENE BL SP  10     1.  .00385  1. 4    ESA 2
3111RJL17 57301.50023 1    COLECURC    57  10     1.  .01644  1. 4    ESA 2
3111RJL15 57301.50024 2    HEMILYGA NY SP  40     1.  .00022  1. 5    ESA 2
3111RJL15 57301.50024 2    HEMILYGA CR DI  10     1.  .00046  1. 5    ESA 2
3111RJL15 57301.50024 7    MYMEFORM MO MI  10     1.  .00036  1. 5    ESA 2
3111RJL15 57301.50024 1    COLECHRY    01  40     1.  .00120  1. 4    ESA 2
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3111RJL15 57301.50024 2    HEMILYGA CR DI  10     2.  .00046  1. 4    ESA 2
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3111RJL15 57301.50024 2    HEMILYGA BL LE  40     2.  .00013  1. 4    ESA 2
3111RJL15 57301.50024 5    ARANSALT    05  40     1.  .00300  1. 4    ESA 2
3111RJL15 57301.50024 1    LEPI        102 40     2.  .00110  1. 4    ESA 2
3111RJL15 57301.50025 5    COLECOCL HI PA  10     1.  .00322  1. 5    ESA 2
3111RJL15 57301.50025 2    HEMIMIRI    14  10     1.  .00046  1. 5    ESA 2
3111RJL15 57301.50025 0    COLE        04  10     1.  .00020  1. 5    ESA 2
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3111RJL15 57301.50025 2    HOMOCICI AC SP  10     4.  .00033  1. 5    ESA 2
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3111RJL15 57301.50025 1    COLETENE BL SP  10     1.  .00385  1. 4    ESA 2
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3111RJL15 57301.50025 1    COLEPHAL PH SP  10     4.  .00022  1. 4    ESA 2
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3111RJL15 57301.50025 1   COLECORC CA CR  10    1.  .00063  1. 4  ESA 2
3111RJL15 57301.50025 2   HEMILYGA NY SP  40   13.  .00022  1. 4  ESA 2
3111RJL15 57301.50025 2   HEMILYGA BL LE  40    2.  .00013  1. 4  ESA 2
3111RJL15 57301.50025 2   HEMILYGA CR DI  10   19.  .00046  1. 4  ESA 2
3111RJL15 57301.50025 5   ARANSALT     05  40    1.  .00306  1. 4  ESA 2
3111RJL15 57302.50021 1   ORTHACRI AA CO  10    1.  .25766  1. 5  ESA 2
3111RJL15 57302.50021 5   ARANSALT     05  40    1.  .00306  1. 4  ESA 2
3111RJL15 57302.50021 1   COLECORC CA IN  10    1.  .00141  1. 4  ESA 2
3111RJL15 57302.50021 1   COLETENE BL SP  10    1.  .00385  1. 4  ESA 2
3111RJL15 57302.50021 1   COLECARA HA DE  10    1.  .01412  1. 4  ESA 2
3111RJL15 57302.50021 2   HEMILYGA NY SP  40    1.  .00022  1. 4  ESA 2
3111RJL15 57302.50021 2   TRYCIMMI     01  10    1.  .00006  1. 4  ESA 2
3111RJL15 57302.50022 2   HOMOCICI AC SP  10    2.  .00033  1. 5  ESA 2
3111RJL15 57302.50022 1   COLEPHAL PH SP  10    2.  .00022  1. 4  ESA 2
3111RJL15 57302.50022 1   COLECORC     57  10    2.  .01644  1. 4  ESA 2
3111RJL15 57302.50022 2   HEMILYGA CR DI  10    3.  .00046  1. 4  ESA 2
3111RJL15 57302.50023 5   COLECOCC MI CO  40    1.  .00216  1. 5  ESA 2
3111RJL15 57302.50023 2   HOMOCICI AC SP  10    1.  .00033  1. 5  ESA 2
3111RJL15 57302.50023 7   MYMEFORM MO MI  10    3.  .00036  1. 5  ESA 2
3111RJL15 57302.50023 1   COLECORC MY GR  10    1.  .00353  1. 4  ESA 2
3111RJL15 57302.50023 1   COLECORC CA CR  10   11.  .00063  1. 4  ESA 2
3111RJL15 57302.50023 1   COLECORC AN SP 210    1.  .00046  1. 4  ESA 2
3111RJL15 57302.50023 1   COLECHRY CH SP  10    1.  .00071  1. 4  ESA 2
3111RJL15 57302.50023 1   COLECARA AM FA  10    1.  .00046  1. 4  ESA 2
3111RJL15 57302.50023 2   HEMILYGA NY SP  40    3.  .00022  1. 4  ESA 2
3111RJL15 57302.50023 1   HEMILYGA CR DI  10    1.  .00046  1. 4  ESA 2
3111RJL15 57302.50023 1   LEPINOCI     08  40    2.  .00816  1. 4  ESA 2
3111RJL15 57302.50024 2   HEMILYGA NY SP  40    2.  .00022  1. 5  ESA 2
3111RJL15 57302.50024 2   HEMILYGA BL LE  40    2.  .00013  1. 5  ESA 2
3111RJL15 57302.50024 7   MYMEFORM MO MI  10    2.  .00036  1. 5  ESA 2
3111RJL15 57302.50024 7   MYMEFORM FO RE 210    2.  .00070  1. 5  ESA 2
3111RJL15 57302.50024 1   COLECHRY     01  40    2.  .00120  1. 4  ESA 2
3111RJL15 57302.50024 1   COLECORC CA CR  10    1.  .00063  1. 4  ESA 2
3111RJL15 57302.50024 2   HEMILYGA BL LE  10    1.  .00010  1. 4  ESA 2
3111RJL15 57302.50024 2   HEMILYGA BL LE  40    4.  .00013  1. 4  ESA 2
3111RJL15 57302.50024 2   HEMILYGA CR DI  10    3.  .00046  1. 4  ESA 2
3111RJL15 57302.50024 7   MYMEFORM MO MI  10    1.  .00036  1. 4  ESA 2
3111RJL15 57302.50024 1   LEPINOCI     09  40    1.  .00266  1. 4  ESA 2
3111RJL15 57302.50025 2   HOMOCICI AT MA  10    1.  .00036  1. 5  ESA 2
3111RJL15 57302.50025 2   HOMOCICI AC SP  10    1.  .00033  1. 5  ESA 2
3111RJL15 57302.50025 1   COLECORC CA CR  10    7.  .00063  1. 4  ESA 2
3111RJL15 57302.50025 1   COLECORC MY GR  10    3.  .00353  1. 4  ESA 2
3111RJL15 57302.50025 1   COLETENE BL SP  10    2.  .00385  1. 4  ESA 2
3111RJL15 57302.50025 2   HEMILYGA CR DI  10   11.  .00046  1. 4  ESA 2
3111RJL15 57302.50025 2   HEMILYGA BL LE  40    3.  .00013  1. 4  ESA 2
3111RJL15 57302.50025 2   HEMILYGA BL LE  10    1.  .00010  1. 4  ESA 2
3111RJL15 57302.50025 2   HEMILYGA NY SP  40   12.  .00022  1. 4  ESA 2
3111RJL17 57301.50021 0   DIPT         121 10    1.  .00056  1. 5  ESA 2
3111RJL17 57301.50021 2   HOMOCICI AC PE  40    2.  .00050  1. 5  ESA 2
3111RJL17 57301.50021 2   HOMOCICI DO SP  40    1.  .00132  1. 5  ESA 2
3111RJL17 57301.50021 2   HOMOCICI AT SP  10    5.  .00056  1. 5  ESA 2
3111RJL17 57301.50021 2   HOMOCICI CO SE  10    1.  .00350  1. 5  ESA 2
3111RJL17 57301.50021 2   HOMOCICI AC SP  10    1.  .00033  1. 5  ESA 2
3111RJL17 57301.50021 5   HEMIPLOO EI SP  40    1.  .01130  1. 4  ESA 2
3111RJL17 57301.50021 0   DIPICECI     11  10    1.  .00001  1. 4  ESA 2
3111RJL17 57301.50021 1   COLETENE BL SP  10    2.  .00385  1. 4  ESA 2
3111RJL17 57301.50021 1   COLECARA HA DE  10    2.  .01412  1. 4  ESA 2
3111RJL17 57301.50021 1   COLECORC MY GR  10    1.  .00353  1. 4  ESA 2
3111RJL17 57301.50021 1   COLECHRY     01  40    4.  .00120  1. 4  ESA 2
3111RJL17 57301.50021 1   COLEANTI AN LO  10   12.  .00012  1. 4  ESA 2
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3111RJL17 573E1.50021 2   HEMILYGA BL LE  40   19.  .00013  1. 4  ESA 2
3111RJL17 573E1.50021 5   ARANTHOM AY LA  10    2.  .00910  1. 4  ESA 2
3111RJL17 573E1.50021 7   HYMENORM MO MI 210    1.  .00180  1. 4  ESA 2
3111RJL17 573E1.50021 2   HOMOCIC1 AC SP  10    2.  .00033  1. 4  ESA 2
3111RJL17 573E1.50022 5   COLECOCC HI CO  10    1.  .00589  1. 5  ESA 2
3111RJL17 573E1.50022 2   HOMOCIC1 AE PE  40    1.  .00050  1. 5  ESA 2
3111RJL17 573E1.50022 2   HOMOCIC1 AT SP  10    3.  .00056  1. 5  ESA 2
3111RJL17 573E1.50022 2   HOMOCIC1 GI LA  10    1.  .00030  1. 5  ESA 2
3111RJL17 573E1.50022 1   COLECHRY     01  40   37.  .00120  1. 4  ESA 2
3111RJL17 573E1.50022 1   COLETENE BL SP  10    3.  .00385  1. 4  ESA 2
3111RJL17 573E1.50022 1   COLECARA SE PL  10    2.  .00193  1. 4  ESA 2
3111RJL17 573E1.50022 1   COLECORC AP SP  10    1.  .00032  1. 4  ESA 2
3111RJL17 573E1.50022 1   COLEANTI AN SP  10    3.  .00066  1. 4  ESA 2
3111RJL17 573E1.50022 2   HEMILING     10  10    1.  .00010  1. 4  ESA 2
3111RJL17 573E1.50023 2   HOMOCIC1 AC SP  10    2.  .00033  1. 5  ESA 2
3111RJL17 573E1.50023 2   HOMOCIC1 AT SP  10    6.  .00056  1. 5  ESA 2
3111RJL17 573E1.50023 2   HOMOCIC1 GI LA  10    3.  .00030  1. 5  ESA 2
3111RJL17 573E1.50023 7   HYMENORM MO MI  10    8.  .00038  1. 5  ESA 2
3111RJL17 573E1.50023 5   ARANTHOM AY LA  10    1.  .00910  1. 4  ESA 2
3111RJL17 573E1.50023 1   COLEBROC AC AO  10    5.  .00092  1. 4  ESA 2
3111RJL17 573E1.50023 1   COLECHRY     01  40   29.  .00120  1. 4  ESA 2
3111RJL17 573E1.50023 5   COLEMIST AE PI  10    1.  .00358  1. 4  ESA 2
3111RJL17 573E1.50023 5   COLECOCC HI CO  40    1.  .00210  1. 4  ESA 2
3111RJL17 573E1.50023 1   COLECORC CA CR  10    1.  .00063  1. 4  ESA 2
3111RJL17 573E1.50023 1   COLETENE BL SP  10    2.  .00385  1. 4  ESA 2
3111RJL17 573E1.50023 1   COLEANTI AN LO  10    4.  .00012  1. 4  ESA 2
3111RJL17 573E1.50023 2   HEMILYGA BL LE  40   13.  .00013  1. 4  ESA 2
3111RJL17 573E1.50023 2   HEMILYGA NY SP  40    4.  .00022  1. 4  ESA 2
3111RJL17 573E1.50023 2   HOMOCIC1 AC SP  10    2.  .00033  1. 4  ESA 2
3111RJL17 573E1.50024 2   HOMOCIC1 AC SP  10    2.  .00033  1. 5  ESA 2
3111RJL17 573E1.50024 2   HOMOCIC1 AT SP  10    3.  .00056  1. 5  ESA 2
3111RJL17 573E1.50024 2   HOMOCIC1 PL PL  40    2.  .00011  1. 5  ESA 2
3111RJL17 573E1.50024 2   HOMOCIC1 GI LA  40    1.  .00020  1. 5  ESA 2
3111RJL17 573E1.50024 1   COLECHRY PH SP  10    1.  .00010  1. 5  ESA 2
3111RJL17 573E1.50024 5   ACARLRY1     02  10    2.  .00025  1. 4  ESA 2
3111RJL17 573E1.50024 1   COLEANTI AN LO  10    4.  .00012  1. 4  ESA 2
3111RJL17 573E1.50024 1   COLECHRY     01  40    6.  .00120  1. 4  ESA 2
3111RJL17 573E1.50024 1   COLECARA AM PA  10    1.  .00646  1. 4  ESA 2
3111RJL17 573E1.50024 1   COLECORC CA CR  10    1.  .00063  1. 4  ESA 2
3111RJL17 573E1.50024 2   HEMILYGA BL LE  40    3.  .00013  1. 4  ESA 2
3111RJL17 573E1.50024 7   HYMENORM MO MI  10    2.  .00038  1. 4  ESA 2
3111RJL17 573E1.50025 2   HOMOCIC1 AE PE  10    1.  .00312  1. 5  ESA 2
3111RJL17 573E1.50025 2   HOMOCIC1 AE PE  40    1.  .00050  1. 5  ESA 2
3111RJL17 573E1.50025 2   HOMOCIC1 AT SP  10    3.  .00056  1. 5  ESA 2
3111RJL17 573E1.50025 2   HOMOCIC1 GI LA  10    1.  .00030  1. 5  ESA 2
3111RJL17 573E1.50025 5   ARANTHOM AY LA  10    2.  .00910  1. 4  ESA 2
3111RJL17 573E1.50025 5   ACARLRY1     02  10    4.  .00025  1. 4  ESA 2
3111RJL17 573E1.50025 1   COLECORC CA CR  10    1.  .00063  1. 4  ESA 2
3111RJL17 573E1.50025 1   COLECORC MY GR  10    1.  .00353  1. 4  ESA 2
3111RJL17 573E1.50025 1   COLECHRY     01  40   31.  .00120  1. 4  ESA 2
3111RJL17 573E1.50025 1   COLETENE BL SP  10    2.  .00385  1. 4  ESA 2
3111RJL17 573E1.50025 1   COLETENE BL SP 140    1.  .01210  1. 4  ESA 2
3111RJL17 573E1.50025 2   HEMILYGA BL LE  40   11.  .00013  1. 4  ESA 2
3111RJL17 573E1.50025 1   COLEBROC AC PR  10    1.  .00062  1. 4  ESA 2
3111RJL17 573E1.50025 0   COLE         03  40    1.  .00102  1. 4  ESA 2
3111RJL17 573E1.50025 1   COLEANTI AN LO  10    3.  .00012  1. 4  ESA 2
3111RJL16 573E2.50021 2   HOMOCIC1 AT SP  40    3.  .00046  1. 5  ESA 2
3111RJL16 573E2.50021 2   HOMOCIC1 GI LA  10    1.  .00030  1. 5  ESA 2
3111RJL16 573E2.50021 5   COLECOCC HI CO  40    2.  .00210  1. 5  ESA 2
3111RJL16 573E2.50021 7   HYMENORM MO MI  10    1.  .00038  1. 5  ESA 2
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3111RJL16 573E2.50021 1   LEMINOCI      05  40     3.  .02316  1. 4   ESA 2
3111RJL16 573E2.50021 1   COLECHRY      01  40     7.  .00120  1. 4   ESA 2
3111RJL16 573E2.50021 1   COLETENE BL SP 10     1.  .00385  1. 4   ESA 2
3111RJL16 573E2.50021 1   COLECORC AM PI 10     1.  .00042  1. 4   ESA 2
3111RJL16 573E2.50021 2   MEMILYGA BL LE 40     3.  .00013  1. 4   ESA 2
3111RJL16 573E2.50021 5   ARANTHOM XY LA 10     1.  .00916  1. 4   ESA 2
3111RJL16 573E2.50021 5   ACARERYT      02  10     1.  .00025  1. 4   ESA 2
3111RJL16 573E2.50022 2   MOMOCICI AT SP 10     5.  .00056  1. 5   ESA 2
3111RJL16 573E2.50022 1   MYMEFORM MO PI 10     1.  .00036  1. 5   ESA 2
3111RJL16 573E2.50022 1   COLECHRY      01  40     8.  .00120  1. 5   ESA 2
3111RJL16 573E2.50022 1   COLEPHAL PH SP 10     1.  .00022  1. 5   ESA 2
3111RJL16 573E2.50022 1   COLECORC MY GR 10     1.  .00353  1. 5   ESA 2
3111RJL16 573E2.50022 1   COLECARA MA OE 10     2.  .01412  1. 5   ESA 2
3111RJL16 573E2.50022 1   COLETENE BL SP 10     1.  .00385  1. 5   ESA 2
3111RJL16 573E2.50022 5   COLECOCC MI CO 40     1.  .00210  1. 4   ESA 2
3111RJL16 573E2.50022 2   MEMILYGA MY SP 40    12.  .00022  1. 4   ESA 2
3111RJL16 573E2.50022 2   MEMILYGA BL LE 40     3.  .00013  1. 4   ESA 2
3111RJL16 573E2.50022 0   COLE          03  40     1.  .00102  1. 4   ESA 2
3111RJL16 573E2.50022 5   ARANGNAP      09  10     1.  .00234  1. 4   ESA 2
3111RJL16 573E2.50022 0   MYME          74  10     1.  .00002  1. 4   ESA 2
3111RJL16 573E2.50022 0   MYME          75  10     1.  .00001  1. 4   ESA 2
3111RJL16 573E2.50022 0   MYME          76  10     1.  .00010  1. 4   ESA 2
3111RJL16 573E2.50022 2   MEMILYGA CR OI  10     2.  .00046  1. 4   ESA 2
3111RJL16 573E2.50023 2   MOMOCICI AC SP  10     3.  .00033  1. 5   ESA 2
3111RJL16 573E2.50023 2   MOMOCICI AT SP  10     2.  .00056  1. 5   ESA 2
3111RJL16 573E2.50023 1   LEPINOCI      05  40     1.  .02316  1. 4   ESA 2
3111RJL16 573E2.50023 5   ARANTHOM XY LA  10     1.  .00916  1. 4   ESA 2
3111RJL16 573E2.50023 1   COLECHRY      01  40     7.  .00120  1. 4   ESA 2
3111RJL16 573E2.50023 1   COLETENE BL SP  10     1.  .00385  1. 4   ESA 2
3111RJL16 573E2.50023 1   COLECARA AM FA  10     1.  .00646  1. 4   ESA 2
3111RJL16 573E2.50023 1   COLECARA SE PL  10     1.  .00193  1. 4   ESA 2
3111RJL16 573E2.50023 1   COLECORC AP SP  10     1.  .00032  1. 4   ESA 2
3111RJL16 573E2.50023 0   DIPTECI       11  10     2.  .00001  1. 4   ESA 2
3111RJL16 573E2.50024 2   MOMOCICI AC SP  10     2.  .00033  1. 5   ESA 2
3111RJL16 573E2.50024 2   MOMOCICI AT SP  10    12.  .00056  1. 5   ESA 2
3111RJL16 573E2.50024 2   MOMOCICI GI LA  40     1.  .00020  1. 5   ESA 2
3111RJL16 573E2.50024 5   ARANTHOM XY LA  10     1.  .00916  1. 4   ESA 2
3111RJL16 573E2.50024 1   COLECHRY      01  40    10.  .00120  1. 4   ESA 2
3111RJL16 573E2.50024 1   COLECORC CA CR  10     1.  .00063  1. 4   ESA 2
3111RJL16 573E2.50024 1   COLECORC MY GR  10     1.  .00353  1. 4   ESA 2
3111RJL16 573E2.50024 5   ACARERYT      02  10     1.  .00025  1. 4   ESA 2
3111RJL16 573E2.50024 2   MOMOPSEU      10  40     1.  .00049  1. 4   ESA 2
3111RJL16 573E2.50024 1   MYMEFORM SO MO  10     1.  .00142  1. 4   ESA 2
3111RJL16 573E2.50025 5   COLECOCC MI CO  40     1.  .00210  1. 5   ESA 2
3111RJL16 573E2.50025 1   COLECHRY PH SP  10     1.  .00010  1. 5   ESA 2
3111RJL16 573E2.50025 2   MOMOCICI AT SP  10    11.  .00056  1. 5   ESA 2
3111RJL16 573E2.50025 2   MOMOCICI AC SP  10     3.  .00033  1. 5   ESA 2
3111RJL16 573E2.50025 1   MOMOCICI CO SE  10     1.  .00355  1. 5   ESA 2
3111RJL16 573E2.50025 1   MYMEFORM MO PI  10     8.  .00036  1. 5   ESA 2
3111RJL16 573E2.50025 5   ARANTHOM XY LA  10     1.  .00916  1. 4   ESA 2
3111RJL16 573E2.50025 5   ARANTHOM XY SP 240     1.  .00042  1. 4   ESA 2
3111RJL16 573E2.50025 5   ACARERYT      02  10     4.  .00025  1. 4   ESA 2
3111RJL16 573E2.50025 1   COLECHRY      01  40    10.  .00120  1. 4   ESA 2
3111RJL16 573E2.50025 5   COLECOCC MI CO  40     1.  .00210  1. 4   ESA 2
3111RJL16 573E2.50025 1   COLETENE BL SP  10     1.  .00385  1. 4   ESA 2
3111RJL16 573E2.50025 2   MEMILYGA BL LE  40     6.  .00013  1. 4   ESA 2
3111RJL16 573F1.50021 2   MEMIMIRI LY PE  10     1.  .00120  1. 5   ESA 2
3111RJL16 573F1.50021 1   COLECORC CA CR  10     1.  .00063  1. 4   ESA 2
3111RJL16 573F1.50021 1   COLECHRY      01  40     3.  .00120  1. 4   ESA 2
3111RJL16 573F1.50021 1   COLECARA SE PL  10     1.  .00193  1. 4   ESA 2
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