

## **Production-Consumption Dynamics of Legumes: A Study in Rural Meghalaya under North Eastern Hill Region of India**

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### **ABSTRACT**

*In the state of Meghalaya, the area, production as well as consumption of legumes are reported to be still very low. It was in this backdrop, a study was conducted to understand the underlying causes of such unsatisfactory production-consumption scenario and suggest on some remedial measures. The primary data was collected through interviewing 150 legume growers of three major legume growing districts of the state. Alongside, Participatory Learning and Action tool was employed especially for gaining comprehension of the local wisdom regarding legume cultivation. The study revealed that the average area under legumes was highest in West Garo Hills district (0.87 ha) followed in descending order by East Khasi Hills (0.33 ha) and West Jaintia Hills (0.07 ha). It was also transpired that the per capita daily legume consumption in West Garo Hills district, West Jaintia Hills district and East Khasi Hills district was 77.16g/day, 60.34 g/day and 43.42 g/day respectively signifying far less than the WHO's set standard of 80 g/day at least for the latter two districts. The important explaining cause appeared to be cultural incompatibility due to more preference on animal proteins over plant based ones by the respondents.*

**Key Words:** *Legume, Consumption pattern, Meghalaya, Participatory Learning and Action (PLA).*

Legumes are the members of the bean family Leguminosae. Though legumes are grown as food and fodder, they are also important soil improving components for agriculture and agro-forestry. Being rich source of plant proteins and a score of essential amino acids responsible for body building, food legumes play an important and diverse role in the farming systems and in the diets of poor people around the globe. Even the by-products of pulses like leaves, pod coats and bran are fed to animals. Of late, due to soaring market price in due compliance of the demand-supply malady in the country, production of pulses (which are basically legume crops) has been turning out to be a potential commercial crop. In spite of such importance as well as existence of a traditional culture of growing different legume crops in Meghalaya by the native people, the area under legumes and its production is, nevertheless, very low in the state. In accordance with the published document, production of legumes is as low as only 4228 metric tonnes therein (Directorate of Agriculture, Government of Meghalaya, 2011-12). Further, the per capita consumption of legume in the daily diet of the people is also observed to be far less as compared to the World Health Organisation recommended quantity of 80g per capita per day.

In terms of the Census Report (2011), the state of Meghalaya is pervaded by the presence of different backward community people (86.15% ST population) who are, as a general case, characterized by marginality and extreme resource poorness. Therefore, legume cultivation may turn out to be a profitable enterprise to them apart from potentially addressing the issue of their household nutritional insecurity once we are able to work out the strategic intervention points and processes from the basis of identification of the impeding

production-consumption attributes associated with the various legume crops cultivated in the state. It was in this backdrop that the present study was conducted during 2014 with the following objectives:

1. To understand the production-consumption scenario of legumes grown in rural Meghalaya.
2. To analyze the possible reasons behind the poor coverage, low production and inadequate consumption of legumes in the state.

### **METHODOLOGY**

The study was conducted in the North-Eastern State of Meghalaya, which consists of three major hill territories viz., Garo Hills, Jaintia Hills, and Khasi Hills. And all these three territories are characterized by the presence of varied ethnic groups along with their differing languages and culture. In order to gain better comprehension as per set out objectives of the study, one district each from all those three territories were purposively selected for the study based upon the criteria of having highest area under legume crops amongst the constituent territorial districts. Thus, the selected districts were East Khasi Hills of Khasi Hills territory, West Jaintia Hills of Jaintia Hills territory and West Garo Hills of Garo Hills territory. From each of those three selected districts one block, having the highest area under legume crops, was purposively picked up. Thus, Myllem block from East Khasi Hills district, Thadlaskien block from West Jaintia Hills district and Selsella block from West Garo Hills district got selected. Again, based upon size, two to three villages were randomly selected from each of those chosen block and in the process, Laitjem and Sadew villages from Myllem block; Khanduli, Umshangiar and Nongthymme villages from Thadlaskien block, and Horipur, Nalbari and Magurmari villages from Selsella block were selected. Finally, a total of 150

respondents were selected through probability proportionate to size sampling so as to adequately compensate for the villages having a lower number of legume cultivators from those eight selected villages. The field data were collected through employing personal interview as well as conducting Participatory Rural Appraisal (PRA) exercises in the selected villages. PRA was conducted in order to especially better understand the legume profile of the study areas in terms of its spatial allocation (through crop mapping and transect walk) and changing pattern of legume cultivation (through time line and trend analysis).

## RESULTS AND DISCUSSION

### The Legumes Production Scenario

Types of various legume crops grown

Crop mapping exercises and simultaneous probing through dialogue with the village resource persons revealed that in the case of West Garo Hills district legumes were being grown by the respondents mainly in parcels of land on the river banks which were not being considered fit by them for the cultivation of other crops like rice and in case of West Jaintia Hills district the legumes were observed to be remaining confined to the fringe areas in and around otherwise marginal lands

under homestead situations. In East Khasi Hills district, though the pattern of legume cultivation appeared to be following the same pattern as of West Jaintia Hills district (i.e. mainly in and around homestead situations), a perceivable difference for that West Jaintia Hills district could, nevertheless, be traced out in the sense that the farming community were found to be putting more value on the crop in consideration of its higher cost. From the participatory transect walk exercises it could be understood that around 48.21 per cent legume growers of the constituent villages of East Khasi Hills district were protecting their standing legume crops through fencing as a conscious measure to prevent grazing. Out of 11 different cultivated legumes in the study area, 4 legume crops viz., gram, pigeon pea, lentil and khesari were being grown exclusively in West Garo Hills district and another 4 legume crops viz., soybean, Dolichos bean, toh chong and toh kba were found of being cultivated exclusively in West Jaintia Hills district. In case of East Khasi Hills district, one exclusive legume variety in the form of long bean was found to have been under cultivation. Peas and French bean were noticed of being grown by the farmers in both the districts of West Jaintia Hills and East Khasi Hills (Table 1).

**Table 1**  
**Types of various legume crops grown in the areas under study**

Types of legume crops		West Garo Hills district	West Jaintia Hills district	East Khasi Hills district
Common Name	Scientific Name			
Green gram and black gram	Vigna mungo and Vigna radiate	✓		
Pigeon pea	Cajanus cajan	✓		
Khesari (Grass Pea)	Lathyrus sativus	✓		
Lentil	Lens culinaris	✓		
Toh chong	-		✓	
Dolichos bean	Lablab purpureus		✓	
Peas	Pisum sativum		✓	✓
Soybean	Glycine max		✓	
Toh kba	-		✓	
French bean	Phaseolus vulgaris		✓	✓
Long bean	Vigna unguiculata			✓

*\*Scientific names for two purely locally cultivated legumes could not be known*

### Cultivation scenario of legumes

A perusal of Table 2, pertaining to the areas under cultivation of different crops including legumes by the respondents along with family wise average areas being devoted to all of those crops, revealed that among the selected districts, West Garo Hills was having relatively higher cultivated area under legumes (59.87 ha) followed in descending order by East Khasi Hills district (8.42 ha) and West Jaintia Hills district (4.27

ha). The Table 2 was further suggestive of the fact that whereas average area, put under legume cultivation per family by combining the areas of both kharif and rabi seasons, was highest (0.87 ha) in case of West Garo Hills district, in cases of the districts of East Khasi hills and West Jaintia Hills, however, the areas under legume cultivation was only 0.33 ha and a meagre 0.07 ha respectively. In West Jaintia Hills, legumes were mainly being grown as purely rain fed crops in mixed

cropping system along with other vegetables. Soybean had the highest average cultivated area (0.026 ha) in the district and the lowest being Dolichos bean (0.007 ha). In East Khasi Hills district, although family wise average cultivated area under legume was low, it was almost similar also with the areas under the other crops cultivated by the respondents in that district to suggest lower propensity of agriculture in that district as a general case. It was found that peas had a higher per family average cultivated area (0.15 ha), followed by long beans (0.13 ha) and French beans (0.05 ha).

Another notable feature was apparent from the West Garo Hills district in the sense that, though among all the districts the average area put under legume

cultivation per family was appearing to be 0.87 ha, the corresponding S.D. value on the contrary was at the higher side to suggest the existence of high degree of inter-family variation therein in terms of allocation of areas under legume crops. The low area under legumes in the study area might have been the manifestation of the preference of rice over legumes by the farmers. Rice appeared to be the most important crop to them in terms of both physical coverage as well as average areas put under that crop. In West Garo Hills district, the access to irrigation made cultivation of even rabi rice possible therein, which might have also been a contributing factor to the nominal area being devoted under rabi legumes.

**Table 2**  
**Cultivated areas under legumes and other crops**

Sr. No.	Crops	Area under various crops grown (ha)	Per family cultivation of crops (ha)	
			Average area	S.D.
<b>West Garo Hills district (n=69)</b>				
1.	Green gram and black gram	20.95	0.25	0.19
2.	Pigeon pea	16.76	0.26	0.18
3.	Khesari (Grass Pea)	3.32	0.05	0.09
4.	Lentil	18.84	0.28	0.19
	Total Legumes	59.87	0.87	0.50
1.	Kharif rice	145.46	2.10	0.94
2.	Rabi rice	129.1	1.87	0.87
3.	Total rice	274.56	3.97	1.72
4.	Other crops	28.62	0.41	0.79
<b>West Jaintia Hills district (n=56)</b>				
1.	Toh chong	0.57	0.01	0.01
2.	Dolichos bean	0.40	0.007	0.01
3.	Peas	0.47	0.008	0.016
4.	Soybean	1.46	0.026	0.037
5.	Toh kba	0.60	0.01	0.01
6.	French bean	0.70	0.012	0.02
	Total Legumes	4.27	0.07	0.08
1.	Kharif rice	74.4	1.33	1.01
2.	Ginger	3.49	0.06	0.85
3.	Other crops	7.58	0.13	0.27
<b>East Khasi Hills district (n=25)</b>				
1.	Long bean	3.31	0.13	0.11
2.	Peas	3.69	0.15	0.11
3.	French bean	1.42	0.05	0.09
	Total legumes	8.42	0.33	0.28
1.	Potato	8.405	0.34	0.66
2.	Cole crops	5.50	0.22	0.17
3.	Other crops	0.365	0.01	0.03

### Trend analysis of legume cultivation utilizing farmers' wisdom

Farmers' participatory analyses on changing trend relating to legume cultivation was done for the periods between 1970 and 2010 on quinquennial basis in each of all the three selected districts. While Table 3 represented the timeline of different agricultural event relating to legume cultivation in the three selected districts, It was found that the perception made from

farmers' participatory analyses on changing trend of legume cultivation. For West Garo Hills district, under the influence of pulse seeds and inputs distribution programme initiated by the State Agriculture Department during the quinquennia ending 1975 (Table 3), both the areas under legumes as well as its production could attain their peaks during that period. But, discontinuity of such seeds and inputs distribution programme thereafter, had led to gradual decline in area

under legumes in specific till 1995. However, after causing sizable downfall in the meantime, thereafter the area remained stagnant for the last three quinquennia up to 2010. And unfortunately no state run area revival initiative could be captured beyond 1975 through the time line exercise (Table 3). Rather, with the introduction of tubewell irrigation system in the district during the quinquennia ending 1995, irrespective of the land situation, the farmers tended to put their maximum agricultural land under rice in general and rabi rice in specific to cause gradual downfall of pulse area there. Thus, in the absence of any strategic countervailing public sector intervention, the opportunity emerged for the district in reference got lost. On the contrary, in cases of West Jaintia Hills it was observed that although the production and area was low in the first few quinquennia from 1970, the initiation of state government schemes for distributing essential inputs such as seeds and fertilizer, as started during the period 1981-85, area and production under legumes in that district saw a significant boost from that

period up to quinquennia ending 2010. In case of East Khasi Hills, due to no initiative from the state government for development of legume during 1970 to 1990, the area and production of legumes in that district was low in those early quinquennia. However after 1990, with the distribution of vital inputs by the state government, legume cultivation in that district saw significant growth with respect to area and production up to quinquennia ending 2010. So, one aspect became apparent as fall out of trend analysis that the agriculturally backward regions like the present case require continuous support by the concerned governmental authority in the forms of not only mere distribution of seed and/or other production inputs, but also sustained sensitization-cum-popularisation activities so as to properly integrate the technology. But apart from seed/input distribution, no other mention worthy legume based technology integration initiative could be traced out as government intervention at least in the cases of West Garo Hills and East Jaintia Hills (Table 3).

**Table 3**  
**Timeline of legume cultivation in the village sites under study**

Year	Important agricultural events		
	West Garo Hills district	West Jaintia Hills district	East Khasi Hills district
1970-75	State Agriculture Deptt. initiated distribution of pulse seeds and inputs.	Establishment of market in the village.	Area under farming increased.
1976-80	X	X	X
1981-85	X	State Agriculture Deptt. started distribution of seeds, fertilizers, pesticides (rice, legumes, maize).	X
1986-90	X	X	X
1991-95	Started using tube well irrigation for wheat and rabi rice.	X	Peas and French bean cultivation started.
1996-00	Started using fertilizer and pesticide for rice.	X	X
2001-05	X	Training and distribution of soybean seeds started by State Agriculture Deptt.	X
2006-10	X	State Agriculture Deptt. established input warehouse for easy distribution of various inputs	X

#### **Inter-relationships between selected socio-personal variables and area under legumes**

Simultaneous relational study (Table 4) indicated that there remained a significant correlation at 0.05 level of probability between the size of operational land holding of the respondents and their area under legumes in cases of West Garo Hills and West Jaintia Hills District with corresponding 'r' values being 0.490 and 0.622 respectively. But in the case of East Khasi Hills District, no such significant correlation between the size of operational land holding of the respondents

and their area under legumes could be traced out. However, when all three areas were combined for examining the cumulative scenario, a positively significant relation was found at 0.05 level of probability between the size of operational land holding of the respondents and their area under legumes with the corresponding 'r' value being 0.49. Table 4 also revealed existence of no significant relationship between the area under legumes and the age and farming experience of the respondents in all the three districts under study.

**Table 4**  
**Correlation between selected socio-personal variables with area under legumes**

Independent variables	Dependent variable	r- value	p-value
<b>West Garo Hills district (n=69)</b>			
Size of operational land holding	Area under legume	0.490**	0.000
Age		0.184	1.30
Farming experience		0.051	0.676
<b>West Jaintia Hills district (n=56)</b>			
Size of operational land holding	Area under legume	0.622**	000
Age		0.181	1.83
Farming experience		0.144	0.291
<b>East Khasi Hills district (n=25)</b>			
Size of operational land holding	Area under legume	0.068	0.746
Age		-0.169	0.420
Farming experience		-0.170	0.416
<b>All three districts combined (n=150)</b>			
Size of operational land holding	Area under legume	0.49**	000
Age		0.132	0.106
Farming experience		0.063	0.447

\*\* Significant at 0.05 level of probability

#### Reasons for low coverage and production of legumes in rural Meghalaya

The major problem in legume production as indicated by the respondents (Table 5) was non-availability of inputs. Along with allocation of smaller area under legumes, another factor associated with the low production was the almost non-existent irrigation.

A large majority of the farmers were also found to be utilizing indigenous seeds which were not truthfully labeled and they were also not following recommended crop nutrition. Also, many respondents were still ignorant in using pesticides as a protection method even though they reported high pest and diseases incidence.

**Table 5**  
**Production constraints faced by legume farmers (n=150)**

Sr. No.	Criteria	Frequency	Percentage
<b>Source of seeds</b>			
1.	Self propagated	16	10.7
2.	Commercial	55	36.7
3.	Both self propagated and commercial	79	52.6
<b>Types of seeds used</b>			
1.	Indigenous variety	113	74.7
2.	Improved variety	37	25.3
<b>Status of irrigation</b>			
1.	Irrigated	4	2.7
2.	Rain fed	146	97.3
<b>Fertilizer use</b>			
1.	Recommended doses of application	7	4.75
2.	Own choice	84	56.0
3.	No application	59	39.3
<b>Incidence of pest and disease</b>			
1.	Low incidence (< 33% crop loss)	38	25.3
2.	Medium incidence (33-66% crop loss)	64	42.7
3.	High incidence (> 66% crop loss)	48	32
<b>Crop Protection</b>			
1.	Pesticides used	64	42.7
2.	Pesticide un-used	86	57.3

Marketing was also a major hurdle in legume production among the respondents of the study area. The study (Table 6) revealed that the prime problem faced by the respondents in marketing was access to

market information. Majority of the respondents (68.7%) had no access to market information relating to market prices, demand and supply of legumes leading the farmers to sell their produce at a much lower price.

Very few respondents reported problems relating to transportation and storage. This might be due to the small quantity of legumes produced by the individual respondents which required very little transport and

storage. No problem was also indicated by the respondents towards processing of legumes. This was also due to the small quantity of legumes they were used to produce.

**Table 6**  
**Distribution of the respondents according to their marketing problems (n=150)**

Sr. No.	Category	Satisfactory access	Limited access	No access
		Frequency	Frequency	Frequency
1.	Market information	15 (10.0)	32 (21.3)	103 (68.7)
2.	Transportation	124 (82.6)	22 (14.7)	4 (2.7)
3.	Storage	147 (98.0)	3 (2.0)	0 (0.0)
4.	Processing	150 (100.0)	0 (0.0)	0 (0.0)

Note: Figure in the parenthesis indicates percentage to respective total

### Legume consumption scenario in Meghalaya

#### Form and method of legume consumption

The form and method of consumption of legumes was found to be somewhat similar between East Khasi Hills district and West Jaintia Hills district. Most of the legumes in those two districts were found to be consumed as cooked vegetables. However, in West Garo Hills district, legumes were recorded to be under consumption in the form of pulse curry (dal). And very

little legumes were reported to be consumed as fresh vegetables in the district. This might be due to the reason that in West Garo Hills district, the various legumes cultivated were the pulses only. On the contrary, in East Khasi Hills and West Jaintia Hills districts, the legumes cultivated were not pulses but vegetable legumes. Table 7 reveals an account of various forms and methods of legume consumption across the districts under study.

**Table 7**  
**Forms and methods of legume consumption by the respondents**

Sr.No.	Common name	Form of consumption	Method of consumption
<b>West Garo Hills district</b>			
1.	Green gram and black gram	Dried and dehusked	Curry
2.	Pigeon pea	Dried and dehusked	Curry
3.	Khesari (Grass Pea)	Dried and dehusked	Curry
4.	Lentil	Dried and dehusked	Curry and biryani
<b>West Jaintia Hills district</b>			
5.	Toh chong	Vegetable	Boiled or stewed with/ without meat
6.	Dolichos bean	Vegetable	Fried or stewed with/ without meat or fish
7.	Peas	Vegetable	Boiled, fried or stewed with/ without meat or fish
8.	Soybean	Fermented/ vegetable	Boiled or cooked with black sesame
9.	Toh kba	Vegetable	Boiled or stewed with/ without meat
10.	French bean	Vegetable	Boiled, fried or stewed with / without meat or fish
<b>East Khasi Hills District</b>			
11.	Long bean	Vegetable	Boiled, fried or stewed with/ without meat or fish
12.	Peas	Vegetable	Boiled, fried or stewed with/ without meat or fish
13.	French bean	Vegetable	Boiled, fried or stewed with/ without meat or fish

The consumption of legumes by the respondents in the three districts was observed to be very low. For India, the World Health Organization recommended a minimum consumption of 80 gram of pulses / capita /day (Banerjee and Palke, 2010). But from Table 8, it got revealed that the per capita consumption of pulses per day was falling short of that recommendation. It was highest in West Garo Hills district (77 g/day) followed by West Jaintia Hills (60.34 g/day) and East Khasi Hills (43.42 g/day) with lentil being the most

popular legume in all the three districts.

Such poor consumption of legumes might be due to the higher preference of animal proteins to legumes, especially pulses. And that found support from concerned intelligentsia also. Lyngdoh (1991) commented that the people of East Khasi hills were very fond of meat like pork, beef, chicken and others. Fresh and dried fish were also popular non-vegetarian items. Blah and Joshi (2013) also observed red meat to be essential for a complete meal among the Khasi

people of Meghalaya.

**Table 8**  
**District wise daily per capita legume consumption by the respondents**

Sr. No.	District	Av. per capita daily consumption (g/day)	S.D
1.	West Garo Hills district (n=69)	77.16	24.11
2.	West Jaintia Hills district (n=56)	60.34	23.98
3.	East Khasi Hills district (n=25)	43.42	23.89

**Correlation of selected independent variables with the amount of legume consumed by the respondents**

Table 9 is indicative of a significant correlation between daily legume consumption across the responding families with both annual family income and family size. Only in the case of East Khasi Hills district the relation between the daily legume consumption and the annual family income of the responding families was found to be insignificant due

to small representation of 16.67 per cent of the sample population and in due cognizance of the significant relationship between the aforesaid parameters when the areas under study was considered in a combined manner, it may finally be generalized that with the increase in annual income and family size, there occurred simultaneous increase in the amount of legume consumption by the families.

**Table 9**  
**Correlation of selected independent variables with amount of legumes consumed and daily average legume consumption**

Sr. No.	Independent variable	Dependant variable	r-value	p-value
<b>West Garo Hills district (n=69)</b>				
1.	Annual family income	Daily average legume consumption by the responding families	0.421**	0.00
2.	Family size		0.685**	000
<b>West Jaintia Hills district (n=56)</b>				
1.	Annual family income	Daily average legume consumption by the responding families	0.271*	0.043
2.	Family size		0.539**	000
<b>East Khasi Hills district (n=25)</b>				
1.	Annual family income	Daily average legume consumption by the responding families	0.083	0.692
2.	Family size		0.568**	0.003
<b>All three districts combined (n=150)</b>				
1.	Annual family income	Daily average legume consumption by the responding families	0.173*	035
2.	Family size		0.534**	0.000

\*\* Significant at 0.01 level of probability

\* Significant at 0.05 level of probability

**Reasons for low legume consumption by the rural people of Meghalaya**

**Attitude of the respondents towards consumption of legumes**

Table 10 reveals that the low consumption amongst the respondents was not because of low availability of legumes. Rather, non-preference of the taste of legumes due to cultural incompatibility arising out of traditional practice to consume animal protein almost regularly was the main reason as to why the

consumption of legumes in the study area was so low. Such traditional food habit had been so strong that even in spite of sufficient awareness on the part of the respondents regarding multifarious benefits of legumes as food stuff and also its cheaper price compared to animal proteins, those people were still found to be reluctant in increasing the amount of legume consumption as one of their daily food items. Eventually, the bulk of self produced legumes were being sold out to the market as a customary practice.

**Table 10**  
**Farmers' value towards consumption of legumes**

Sl. No.	Item	Maximum obtainable score	Obtained score	Rank
1.	Legumes as a cheap sources of food	750	619	I
2.	Legumes as healthy foods	750	601	II
3.	Legumes are easy to obtain	750	539	III
4.	Encouragement by others	750	479	IV
5.	Consumption of legumes as part of the culture	750	463	V
6.	Legumes as tasty foods	750	395	VI

### CONCLUSION

The findings of the study have illustrated that the legume scenario in rural Meghalaya is still under developed. The production and consumption of legumes is still very low in the study area. The learning experiences gained from the study were suggestive of the constitution of a legume task force to formulate a comprehensive strategy in a time bound manner for enhancement of legume area in the state keeping in view varied farmers' preferences on type of legumes across the three major hill territories. Also, development of modalities of hassle free availability of critical inputs like quality seed materials through well

dispersed retail network, purposeful organization of regular sensitization-cum-training programmes and setting up of adequate market information support service, etc is recommended for development of the legume scenario in Meghalaya. Alongside, training needs assessment and designing of training modules on improved crop husbandry of various legume crops and launching of nutritional awareness campaigns on legumes highlighting essentiality of its consumption for ushering household nutritional security were the other perceived needful areas of interventions

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### REFERENCES

1. Banerjee, G. and Palke, L. M. 2010. *Economics of pulse production and pulse processing in India*. Department of Economic Analysis and Research, National Bank for Agriculture and Rural Development, Mumbai, India.
2. Blah, M. M. and Joshi, S. R. 2013. *Nutritional content evaluation of traditional recipes consumed by the ethnic communities of Meghalaya, India*. *Indian Journal of Traditional Knowledge*, 12(3): 498-505.
3. *Census 2011. Census of India, Ministry of Home Affairs, New Delhi*. [www.censusindia.gov.in](http://www.censusindia.gov.in)
4. *Government of Meghalaya. 2012 Reports on area, production & yield of agricultural crops*. Directorate of Agriculture, Shillong, Meghalaya.
5. Lyngdoh, M. P. R. 1991. *The festival in the history and culture of the Khasi*. Vikas Publishing House Pvt. Ltd.