

Agro-problem:

* 38% losses of agricultural loss happens due to Pest attack
approx: 90,000 loss.

* 50% of applied loss cause Various Soil pollution, gas emission air,

* 60% of nitrogen pollution is cause by crop production.

* Approx { 40% - 80% lost to environment }.

Solution: { To Take proper Testing and Precaution methods with balance fertilizer Usage }.

Government promote agricultural Schemes by providing fund of 6000 Crs. }

Problem:

- India has 86% { Small and Marginal farms }, • Cost is high in Cost
- Large and non-movable, • not easy to handle, • No Cost Sharing
- ~~Agro~~ ^{No} Biological Analysis • No proper Insect Entomological Identification
- ^{No.} ~~Agro~~ based Knowledge based. not got and aged.

Sandy Stone { clay } . Can hold Soil long time . good for Tomato .

Tomato is Commercial Crop in India

Insects & Natural Enemy:

Large Scale dataset

1) Tuta absoluta

{ 10,000+ images per class }

2) Heliothis armigera

3) *Diurapha trifolii* . \rightarrow Leaf eater:

Prompt:

[{ "question": "What pest can be Used for tomato leaf miner?",

"answer": "Use Spiromed at concentration of 0.15 ml/liter." }

]

,

Spiromed \rightarrow Spinetor ~~pesticide~~ pest controller {Blue label}

Selectively high active, low environment toxicity.


```

import numpy as np
import numpy as pd
import warnings
warnings.filterwarnings('ignore')

```

```
df = pd.read_csv("Fertilizer.csv")
```

```
df.head()
```

	Nitrogen	Potassium	Phosphorus	Fertilizer Name
0	87	0	0	Urea
1	12	0	36	DAP
2	7	0	80	Fourteen-Thirty Five - Fourteen.
3	22	0	20	Twenty Eight - Twenty Eight
4	35	0	0	Urea

```
df.describe()
```

	Nitrogen	Potassium	Phosphorus
count	99.000000	99.000000	99.000000
mean	18.909091	3.383838	18.606061
std	11.599693	5.814667	18.476978
min	4.000000	0.000000	0.000000
25%	10.000000	0.000000	9.000000

NDVI

(Normalized Difference Vegetation Index)

a remote sensing measures the greenness and density
of Vegetation in a Satellite image"

<u>Zone</u> <u>type</u>	<u>Altitude</u>	<u>Annual rain</u>
North Eastern	100 - 200	1105
North Western	200 - 600	875
Western	200 - 600	715
Cauvery delta zone	100 - 200	985
Southern	100 - 600	857
High Rainfall	100 - 2000	1420
Hilly and High Altitude	> 2,000	2124

Algorithm:

{ nearred - infrared and red bands } \rightarrow Step 1

Subtract - The red bands from NIR band \rightarrow Step 2.

divide the result by Sum of red and NIR bands \rightarrow Step 3.

Rename the result as NDVI \rightarrow Step 4.

TN \Rightarrow ^{channel numbers:} North-Eastern Agro Climatic
 \hookrightarrow Total 7 zones

{data cleaning}

- 1) Tuta absoluta - 60 - 30:15:15 - 00000 - 00060
- 2) Tuta absoluta - 60 - 30:15:15 - 00061 - 00121
- 3) Helicoverpa armigera Adult - 60 - 30:15:15 - 00122 - 00181
- 4) Helicoverpa armigera Larva - 100 - 50:25:25 - 00182 - 00281
- 5) Liriomyza trifolii Adult - 60 (30:15:15) - 00282 - 00341
- 6) Liriomyza trifolii (Larva) 40 (20:10:10) - 00342 - 00381
- 7) Bemisia tabaci Nymph Adult 80 (40:20:20) - 00382 - 00461
- 8) Bemisia tabaci Nymph - 00462 - 00501 (25:15) = 40
- 9) Spodoptera litura Adult 502 - 00561 - 60 (30:15:15)
- 10) Spodoptera litura Larva 60 (30:15:15) - 00562 - 00621
- 11) Trichogramma spp - 60 (30:15:15) - 00622 - 00681
- 12) Chrysoperla gastrorum - 80 (40:20:20) - 00682 - 00761
- 13) Coccinella spp - 00762 - 00821
- 14) Braconidae 60 (30:15:15) - 00822 - 00881
- 15) Ichneumonidae 60 (30:15:15) - 00882 - 00941
- 16) Nesidiocoris sp
- 17) Encarsia
- 18) Diglyphus sp
- 19) Telenomus sp
- 20) Mimid bug
- 21) Mantis
- 22) Spider

NET-18 ✓
VGL-16 ✓

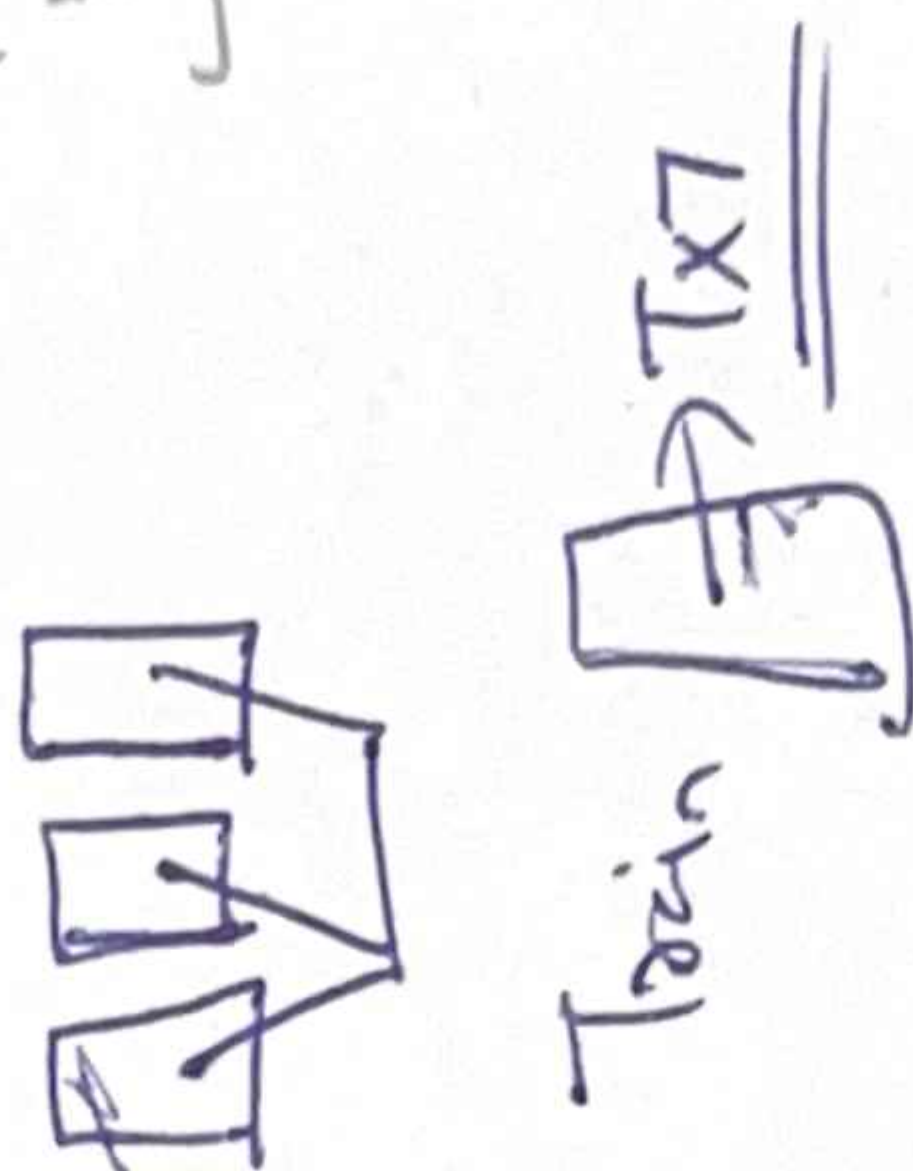
Train - 00001 - 00030 {0}

- 00061 - 00090 {1}

- 0

94%
as
62

Crop



- 16 - Nesidiocoris spp - 60 - ~~40:10:10~~ 30:15:15
 17 - Encarsia spp - 60 - ~~40:10:10~~ 30:15:15
 18 - Diglyphus spp - 60 - ~~40:10:10~~ 30:15:15
 19 - Telenomus spp - 60 - ~~40:10:10~~ 30:15:15
 20 - Mixidbugs - 60 - ~~40:10:10~~ 30:15:15
 21 - Praying mantis - ~~80~~ 80 - 40:20:20
 22 - Spiders - 60 - 30:15:15

Month

Sep
1 week

Sep 20
week

Sep

Sep

Sep

- 16 = 00942 - 01001
 17 = 01002 - 01061
 18 = 01062 - 01121
 19 = 01222 - 01281
 20 = 01282 - 01341
 21 = 01342 - 01421
 22 = 01422 - 01481

- 60 items

- 60 items

- 60 items

- 60 items

- 60 items

- 60 items

- 60 items

Train	text	val.
00942 - 00971	00972 - 973	987 - 1001
1002 - 1031	1032 - 1046	1047 - 1061
1062 - 1091	1092 - 1206	1027 - 1221
1222 - 1223	1252 - 1266	1267 - 1281
1282 - 1311	1312 - 1326	1327 - 1341
1342 - 1381	1382 - 1401	1402 - 1421
1422 - 1451	1452 - 1466	1467 - 1481

- 19 → 01122 - 01181
 20 - 01182 - 01241
 21 - 01242 - 01321
 22 - 01322 -

Pest occurrence data

distribution

Crop Pest name location lat long place month weather place lat long temp

Sep 30
Sunny
Sunny
1st week Sep 30
2nd week Sep 33
3rd week Sep 34
4th week Sep 39

1 week -



52 week weather

Month Year

Place

max
temp

on

Pest ID

Sep 1 week 2024 Coimbatore

32

Sep 2nd week 2024 Coimbatore

27

Sep 3rd 2024

22

Sep 4th 2024

29

Sep 2024 Tranyou

40

32

32

31

Categorized Knowledge Base

Fertilizer structure advice;

{

"Pesticides": [

{ "name": "Imidacloprid", "target":

"Aphids, white flies", "dosage": "17-8 % SL,
0.5 ml / liter" }

],

"Fertilizers": [{ "type": "Nitrogen-rich",

"application": "Use ammonium nitrate during
vegetative growth." }],

"biocontrol": [{ "agent": "Trichogramma chilonis",

"target": "Tomato fruit borer",

"release-rate": "5000 / acre every 10 days" }],

"Organic-methods": [{

"method": "Neem oil spray", "target":

"Aphids, thrips", "dosage": "5 ml / liter" }

]

}

[{ "questions": "What is best Organic fertilizer for Tomatoes?";

"answer": "Compost enriched with bone meal and ash works well for Tomatoes" }

]

Multi-turn Conversation

For advisory:

[{

"conversation": [

{ "role": "user", "content": "How do I control white flies on my tomato plants?" },

{ "role": "bot", "content": "White flies can be managed by using yellow sticky traps and applying neem oil sprays weekly." },

{ "role": "user", "content": "Can I use chemical sprays instead?" },

{ "role": "bot", "content": "Yes, you can use Imidacloprid 17.8% SL, but follow safety guidelines for application." }]

} }

Intent and Entity Labeling :

For AI models :

[

```
{ "text" : "Suggest a fertilizer for flowering  
stage tomatoes.", "intent" : "fertilizer_recom-  
mendation", "entities" : { "crop-stage" :  
"flowering", "crop" : "tomatoes" } },
```

```
{ "text" : "How do I control fruit  
borer organically?", "intent" : "Pest-control",  
"entities" : { "Pest" : "Fruit borer",  
"method" : "organic" } }
```

]