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import
pandas as
pd # Sample
soil data
soil_data = pd.DataFrame({
   'Soil_Type': ['Loamy', 'Clayey', 'Sandy'],
   'pH': [6.5, 5.5, 7.0],
   'Nitrogen': [20, 15, 10],
   'Phosphorus': [15, 10, 5],
   'Potassium': [25, 20, 15]
})

# Function to recommend soil type
def recommend_soil(input_soil,
   soil_data): suitable_soils =
   soil_data[
      (soil_data['pH'] <=
      input_soil['pH'] + 0.5) &
      (soil_data['pH'] >=
      input_soil['pH'] - 0.5) &
      (soil_data['Nitrogen'] <=
      input_soil['Nitrogen'] + 5) &
      (soil_data['Nitrogen'] >=
      input_soil['Nitrogen'] - 5) &
      (soil_data['Phosphorus'] <=
      input_soil['Phosphorus'] + 5) &
      (soil_data['Phosphorus'] >=
      input_soil['Phosphorus'] - 5) &
      (soil_data['Potassium'] <=
      input_soil['Potassium'] + 5) &
      (soil_data['Potassium'] >=
      input_soil['Potassium'] - 5)
   ]
   return suitable_soils

# Crop selection function
def crop_selection(soil_type, water_availability):
   if soil_type == "Loamy" and
      water_availability == "High":
      return "Rice"
   elif soil_type == "Sandy" and
      water_availability == "Low": return
      "Millets"
   elif soil_type == "Clayey" and
      water_availability == "Medium":
      return "Wheat"
   else:
      return "Mixed crops like pulses and legumes"

# Soil management function
def
   soil_management(s
   oil_type): if
   soil_type ==
   "Loamy":
      return "Regular nutrient addition
   and balanced irrigation." elif
   soil_type == "Sandy":
      return "Increase organic matter and
   apply frequent irrigation." elif
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  soil_type == "Clayey":
    return "Ensure proper drainage and
  avoid waterlogging." else:
    return "Add organic compost and practice crop rotation."

# Disease identification function
def
  disease_identificati
  on(symptoms): if
  "yellowing leaves"
  in symptoms:
    return "Nitrogen deficiency, consider applying
  nitrogen-rich fertilizers." elif "wilting" in
  symptoms:
    return "Possible root rot, ensure proper
  drainage and reduce overwatering." elif "brown
  spots" in symptoms:
    return "Fungal infection, use
  appropriate fungicides." else:
    return "Consult an agricultural expert for accurate diagnosis."

# Main function to
run the system def
main():
  print("Welcome to the Crop and Soil
  Management System") print("Please
  select an option:")
  print("1. Soil Type
  Recommendation")
  print("2. Crop
  Selection")
  print("3. Soil Management")
  print("4. Disease Identification")
  choice = int(input("Enter your
  choice (1/2/3/4): ")) if choice
  == 1:
    input_soil = {}
    input_soil['pH'] = float(input("Enter the pH level of the soil: "))
    input_soil['Nitrogen'] = float(input("Enter the Nitrogen content (in mg/kg): "))
    input_soil['Phosphorus'] = float(input("Enter the
    Phosphorus content (in mg/kg): ")) input_soil['Potassium']
    = float(input("Enter the Potassium content (in mg/kg): "))
    recommended_soils = recommend_soil(input_soil, soil_data)

    if not recommended_soils.empty:
      print("Recommended
      Soil Types:")
      print(recommended_s
      oils)
    else:
      print("No suitable soil types found for the given input.")

  elif choice == 2:
    soil_type = input("Enter soil type (Loamy/Sandy/Clayey): ")
    water_availability = input("Enter water
    availability (High/Medium/Low): ") crop =
    crop_selection(soil_type, water_availability)
    print(f"Recommended crop: {crop}")

  elif choice == 3:
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    soil_type = input("Enter soil type
    (Loamy/Sandy/Clayey): ")
    management_advice =
    soil_management(soil_type)
    print(f"Soil management advice: {management_advice}")

elif choice == 4:
    symptoms = input("Enter observed symptoms (e.g., yellowing
    leaves, wilting, brown spots): ") disease =
    disease_identification(symptoms)
    print(f"Disease diagnosis and advice: {disease}")
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  else:
    print("Invalid choice. Please select a valid option.")


main()
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Welcome to the Crop and Soil
Management System Please
select an option:
1. Soil Type Recommendation
2. Crop Selection
3. Soil Management
4. Disease Identification
Enter your choice (1/2/3/4): 1
Enter the pH level of the soil: 5.5
Enter the Nitrogen content (in mg/kg): 15
Enter the Phosphorus content
(in mg/kg): 15 Enter the
Potassium content (in
mg/kg): 15 Recommended Soil
Types:
  Soil_Type     pH  Nitrogen  Phosphorus  Potassium
1  Clayey  5.5 15      10    20
```

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Welcome to the Crop and Soil Management System
Please select an option:
1. Soil Type Recommendation
2. Crop Selection
3. Soil Management
4. Disease Identification
Enter your choice (1/2/3/4): 2
Enter soil type (Loamy/Sandy/Clayey): Clayey
Enter water availability (High/Medium/Low): medium
Recommended crop: Mixed crops like pulses and legumes
```

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Welcome to the Crop and Soil Management System
Please select an option:
1. Soil Type Recommendation
2. Crop Selection
3. Soil Management
4. Disease Identification
Enter your choice (1/2/3/4): 3
Enter soil type (Loamy/Sandy/Clayey): clayey
Soil management advice: Add organic compost and practice crop rotation.
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Welcome to the Crop and Soil Management System
Please select an option:
1. Soil Type Recommendation
2. Crop Selection
3. Soil Management
4. Disease Identification
Enter your choice (1/2/3/4): 4
Enter observed symptoms (e.g., yellowing leaves, wilting, brown spots): yellowing
leaves
Disease diagnosis and advice: Nitrogen deficiency, consider applying nitrogen-rich
fertilizers.
```