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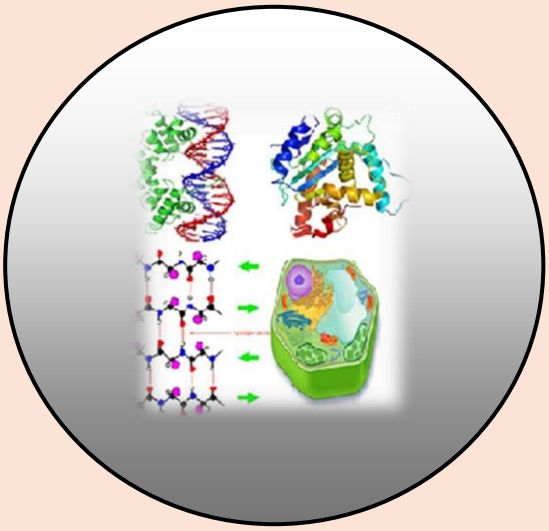

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REVIEW ARTICLE

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How to make Potato Dextrose Agar from Potato

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ABSTRACT

Potato dextrose agar and potato dextrose broth are common microbiological growth media made from potato infusion and dextrose. Potato dextrose agar is the most widely used medium for growing fungi and bacteria. PDA has the capability to culture various bacteria and fungi found in the soil. Potato dextrose agar is a versatile growing medium for bacteria and fungi (yeasts and molds). This agar is used for a broad range of fungi but there are other agars that are more selective for specific types of fungi. It is made up of potato infusion and dextrose (a.k.a glucose). The potato infusion and dextrose as a carbohydrate source support the luxuriant growth of fungi and bacteria and is observed to encourage mold sporulation and pigment production in certain dermatophytes. The pH of Potato Dextrose Agar medium is about 5.6+/- 0.2. Use HCl and KOH for the pH adjustment. In this work we show in the field of agriculture, Potato Dextrose Agar is used to study the growth of soil-borne fungi and other organisms that affect crop yields. It can also be used to study the effect of different environmental conditions on the growth and development of soil-borne organisms. These are just a few of the many uses of Potato Dextrose Agar in different fields. It is an incredibly versatile medium that can be used for a variety of applications and can provide valuable insights into a range of areas.

Keywords: PDA, Potato, Bacteria, Fungi and Agar.

INTRODUCTION

Potato dextrose agar (BAM Media M127 [BAM Media M 127]) and potato dextrose broth are common microbiological growth media made from potato infusion and dextrose. Potato dextrose agar (abbreviated "PDA") is the most widely used medium for growing fungi and bacteria [Harold Eddleman, 1998]. PDA has the capability to culture various bacteria and fungi found in the soil. This agar can be used with antibiotics or acid to inhibit bacterial/fungal growth. PDA is used in the food industry to test for fungi that can spoil food products.

It is also used in the pharmaceutical industry to screen for potential antifungal agents in medications [Pitt and Hocking, 2009].

Potato dextrose agar often abbreviated as PDA. Most mycologists widely use it as a general-purpose medium for yeasts and molds that can be identified to some extent based on their morphological features and their pigmentation in culture often being important for identification of cultures. PDA thus aids in cultivating and differentiating pathogenic and non-pathogenic fungi. Potato Dextrose Agar is a frequently used microbial growth media for cultivation of molds, yeasts and other fungi. It is made up of potato infusion and dextrose (a.k.a glucose). The potato infusion and dextrose as a carbohydrate source support the luxuriant growth of fungi and bacteria and is observed to encourage mold sporulation and pigment production in certain dermatophytes. However, the media may be supplemented with selective agents such as acids (e.g. tartaric acid) or antibiotics (e.g. chloramphenicol, or chlortetracycline) to inhibit the growth of bacteria that can impede the yeasts and mold. Agar acts as a solidifying agent [Potato Dextrose Broth, 2006].

In 2007, an article published in *FEMS Microbiology Letters,* stated importance of copper as supplement to achieve good coloration of fungal cultures on PDA media. The authors reasoned that the sufficient amount of copper is essential for the activity of enzymes involved in pigment production. They also showed that there is a batch to batch variation in copper amount in both commercially available and lab made PDA media. For more information follow the reference.

- Potato Dextrose Agar is used for the detection of yeasts and molds in dairy products and prepared foods.
- It may also be used for the cultivation of yeasts and molds from clinical specimens.
- Potato Dextrose Agar with TA (Tartaric Acid) is recommended for the microbial examination of food and dairy products.
- Potato Dextrose Agar with Chlortetracycline is recommended for the microbial enumeration of yeast and mold from cosmetics.
- Potato Dextrose Agar with Chloramphenicol is recommended for the selective cultivation of fungi from mixed samples table 1.

Table 1. Potato dextrose Agare in laboratory.

value	ingredients & conditions
1000 mL	water
(strained broth from 200 g of infused potato into the water above)	potatoes (sliced washed unpeeled)
20 g	dextrose
20 g	agar powder
5.6±0.2	final pH
25°C	temperature

Table 2. Composition for PDA media with potato infusion.

Ingredients	For 100mL	For 500mL	For 1000ml
Potato (infusion form)	20 gm	100 gm	200 gm
Dextrose	2 gm	10 gm	20 gm
Agar-Agar	1.5 gm	7.5 gm	15 gm
Distilled water	Upto 100mL	Upto 500mL	Upto 1000mL

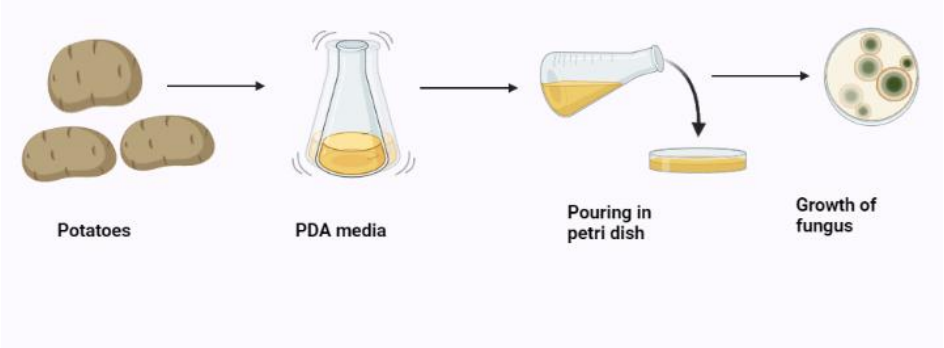

Figure 1. Use of Potato Dextrose Agar (PDA) Media in fungi experimental study.

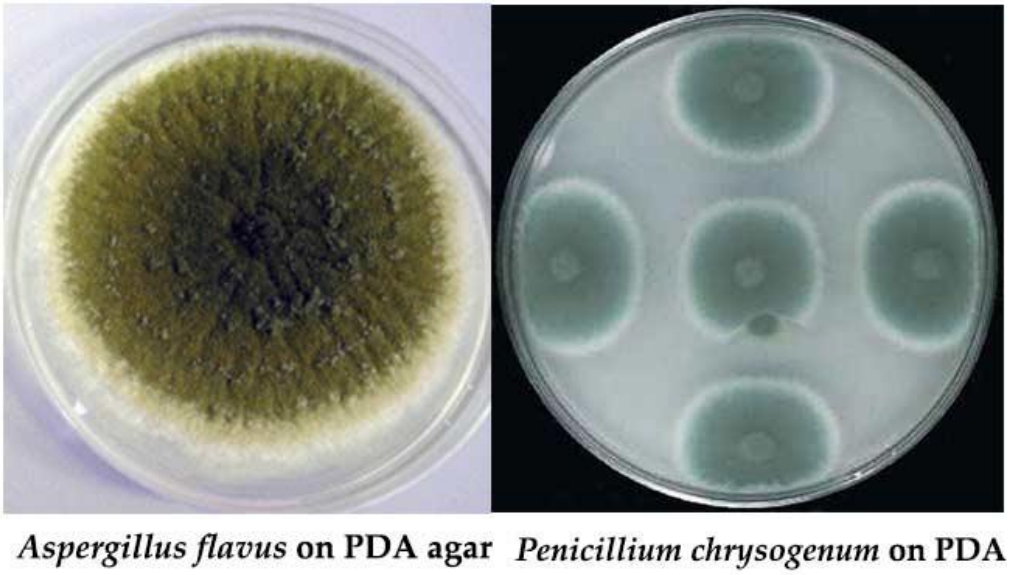

Figure 2. *Aspergillus flavus*: Powdery masses of yellow-green spores on the upper surface and reddish-gold on the lower surface.

Preparation PDA

1. Weigh the ingredients separately with respect to the volume of the media. (Here, we are considering 1L of the media).
2. Suspend the ingredients such as potato infusion (200 gm) or potato extract (4 gm) and glucose (a.k.a dextrose) 20 gm in a glass beaker containing about 900ml of ddH_2O.
3. Dissolve the components in the beaker using a magnetic stirrer. (Heat may be applied to dissolve the medium completely).
4. Adjust the pH of the medium to 5.6 using 0.1 NHCl and 0.1 NKOH.
5. Adjust the broth to a final volume of 1L using ddH_2O.
6. Transfer the broth to conical flask or aliquot into smaller volumes.
7. Now add agar accordingly with respect to the volume of the media (i.e., 15 gms agar for 1L of the media, 3.75 gm for 250 ml).
8. Close the mouth of the flask with a cotton plug. Seal it further with paper and rubber band.
9. Autoclave for 20 min at 15 psi ($1.05kg/cm^2$) on liquid cycle.
10. However, if antibiotics are to be included, their stock solutions should be filter sterilized prior to addition to the media. These antibiotics must be added after the media is cooled to about 45-50ºC.
11. Some formulations prefer the addition of sterile tartaric acid (10%) instead (or in combination) of antibiotics. Tartaric acid decreases the pH to about 3.5. The lowered pH inhibits bacteria growth.
12. Mix well and pour into sterile Petri plates or tubes for slants (figure 1).

Table 3. Atlas, R.M.: *Handbook of Microbiological Media*, second edition. Lawrence C. Parks (1997).

V · T · E	Growth media / agar plates		[hide]
Selective media	Gram positive	Actinomycetota	*Mycobacterium tuberculosis* (Löwenstein–Jensen medium · Middlebrook 7H9 Broth · Middlebrook 7H10 Agar · Middlebrook 7H11 Agar) · *Mycoplasma pneumoniae* (Eaton's agar)
		Bacillota	*Corynebacterium diphtheriae* (Hoyle's agar) · *Enterococcus* (Bile esculin agar) · *Lactobacillus* (Lee's Agar · MRS agar) · *Lactococcus* (M17 agar) · *Listeria* (Fraser broth · PALCAM) · *Staphylococcus* (Mannitol salt agar · Baird-Parker agar · Vogel–Johnson agar)
	Gram negative	Alphaproteobacteria	*Brucella* (Brucella agar · Farrell's medium)
		Betaproteobacteria	*Neisseria* (Thayer–Martin agar · New York City agar)
		Gammaproteobacteria	*Aggregatibacter actinomycetemcomitans* (*Tryptic soy-serum-bacitracin-vancomycin*) · *Bordetella* (Bordet–Gengou agar) · *Enterobacteriaceae* (VRBD agar) · *Haemophilus influenzae*/*Legionella pneumophila* (Buffered charcoal yeast extract agar) · *Pseudomonas aeruginosa* (Cetrimide agar) · *Salmonella* (XLT agar) · DCA agar · *Salmonella*/*Shigella* (XLD agar)
Differential media	*Lactose fermenting gram negative* (MacConkey agar/Sorbitol-MacConkey agar · Eosin methylene blue · Endo agar) · Bismuth sulfite agar · Hektoen enteric agar · Lysine iron agar · Simmons' citrate agar · TSI slant		
Fungal media	BAF agar · Czapek medium · Dermatophyte test medium · Malt extract agar · MMN medium · **Potato dextrose agar** · Sabouraud agar · YEPD · YM		
Nonselective media	Blood agar · Chocolate agar · Columbia blood agar · Letheen broth · Lysogeny broth · Nutrient agar · Plate count agar · Trypticase soy agar · Tryptic soy broth		
Other/ungrouped media	Brain heart infusion · Cystine–lactose–electrolyte-deficient agar · Cystine tryptic agar · Glucose phosphate broth · Lauryl tryptose broth · Mannitol motility medium · Mueller–Hinton agar/PNP agar · R2A agar · Schädler agar		

CONCLUSION

There are two ways to make the PDA medium. One, by making potato infusion in lab (Table 1), and using commercially available potato extract (Table 2). Details of potato infusion preparation are mentioned in the following sections [Atlas of Clinical Fungi, 2009].

Potato Dextrose Agar (PDA) is used for the cultivation of fungi. Potato Dextrose Agar (PDA) is a general purpose medium for yeasts and molds that can be supplemented with acid or antibiotics to inhibit bacterial growth. It is recommended for plate count methods for foods, dairy products and testing cosmetics. It is a nutrient-rich medium that supports the growth of a wide variety of microorganisms, including yeast, moulds, and bacteria. PDA is composed of potato infusion, dextrose, agar, and other additives, such as calcium carbonate, magnesium sulphate, and manganese sulphate. PDA can be used for growing clinically significant yeast and molds. The nutritionally rich base (potato infusion) encourages mold sporulation and pigment production in some dermatophytes. In the field of food science, Potato Dextrose Agar is used to study the growth of food-borne pathogens such as *E. coli* and *Salmonella*. It is also used to study the spoilage of food products due to microbial growth. PDA has the capability to culture various bacteria and fungi found in the soil.

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BAM Media M127: Potato Dextrose Agar from the U.S. Food and Drug Administration.

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